sprecher+schuh

CEP9 Electronic Overload Relay

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Sprecher + Schuh does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

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Throughout this manual we use notes to make you aware of safety considerations:

	WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
ATTENTION	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss
	SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

DeviceNet and the DeviceNet logo are trademarks of the Open Device Vendors Association (ODVA).
Microsoft Windows is a registered trademark of the Microsoft Corporation.

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and European Economic Area (EEA). It has been designed and tested to meet the following directives.

EMC Directives

This product is tested to meet the Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) by applying the following standards, in whole:

• EN 60947-4-1 — Low-Voltage Switchgear and Controlgear: Part 4: Contactors and Motor Starters - Section 1: Electromechanical Contactors and Motor Starters

• EN 60947-5-1 — Low-Voltage Switchgear and Controlgear: Part 5: Control Circuit Devices and Switching Elements - Section 1: Electromechanical Control Circuit Devices

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage as amended by 93/68/EEC by applying the safety requirements of EN 60947-4-1 and EN 60947-5-1. For specific information required by EN 60947-4-1 and EN 60947-5-1, see the appropriate sections in this publication.

Notice

This product has been designed for environment A. Use of this product in environment B can cause unwanted electromagnetic disturbances in which case the user could be required to take adequate mitigation measures.

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CEP9 Electronic Overload Relay

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Product Overview

Overview

The CEP9 Electronic Overload Relay is a microprocessor-based electronic overload relay designed to protect three-phase or single-phase AC electric induction motors rated from 0.5...65,000 A. Its modular design, communication options, diagnostic information, simplified wiring, and integration into Logix makes this the ideal overload for motor control applications in an automation system. The CEP9 Electronic Overload Relay provides flexibility, reduces engineering time, and maximizes uptime for important motor starter applications.

Modular Design

Users can select the specific options needed for their motor starter application. The CEP9 Electronic Overload Relay consists of three modules: sensing, control and communications. Users have choices in each of the three with additional accessories to tailor the electronic motor overload for their application's exact needs.

- Wide current range
- Sensing capabilities (Current, Ground Fault Current, and/or Voltage)
- Expansion I/O
- Operator interfaces

Communication Options

Users can select from multiple communication options which integrate with Logix based control systems. Developers can easily add the CEP9 Electronic Overload Relay to Logix based control systems using Integrated Architecture tools such as Add-on Profiles, Add-on Instructions, and Faceplates.

- EtherNet/IP (DLR)
- DeviceNet

Diagnostic Information

The CEP9 Electronic Overload Relay provides a wide variety of diagnostic information to monitor motor performance, proactively alert users to possible motor issues, or identify the reason for an unplanned shut down. Information includes:

- Voltage, Current, & Energy
- Trip / Warning Histories
- % Thermal Capacity Utilization
- Time to Trip
- Time to Reset
- Operational Hours
- Number of Starts
- Trip Snapshot

Simplified Wiring

The CEP9 Electronic Overload Relay provides an easy means to mount to Sprecher + Schuh contactors. A contactor coil adapter is available for the CA7 contactor, which allows the user to create a functional motor starter with only two control wires.

Catalog Number Explanation

CEP9 Electronic Overload Relay modules have their own catalog number. The catalog numbers are explained below.

Sensing Module

CEP9 - ESM - VIG - 23 - 30

Bulletin Number	Module Type	Sensing Module Type	Sensing Current Range
CEP9 Overload Relay	ESM Sensing Module	VIG Current, Ground Fault Current, Voltage, & Power	30 0.5…30 A
		IG Current & Ground Fault Current	60 6…60 A
		I Current	100 10…100 A
			200 20…200 A

Sensing Module Mounting Style

23	Mounts to CA7-9…-23 Contactor
55	Mounts to CA7-30…-55 Contactor
97	Mounts to CA7-60…-97 Contactor
180	Mounts to CA7-115…-180 Contactor
T	DIN Rail / Panel Mount with Power Terminals
7T	Replacement DIN Rail / Panel Mount with Power Terminals for a CEP7 Panel Mount Adapter
P	DIN Rail / Panel Mount with Pass-thru Power Conductors
CT	DIN Rail / Panel Mount with Pass-thru Power Conductors (used with External CTs)

Control Module

CEP9 - EIO - 43 - 120

Bulletin Number	Module Type	I/O Count	Control Voltage
CEP9 Overload Relay	EIO I/O Only Control Module	63 6 Inputs / 3 Relay Outputs	24D 24V DC
	EIOGP I/O and Protection Control Module (External Ground Fault Sensing and PTC)	43 4 Inputs / 3 Relay Outputs	120 110…120V AC, 50/60 Hz
		42 4 Inputs / 2 Relay Outputs	240 220…240V AC, 50/60 Hz
		22 2 Inputs / 2 Relay Outputs	

Communication Module

CEP9 - ECM - ETR

Bulletin Number	Module Type	Communication Type
CEP9 Overload Relay	ECM Communication Module	ETR EtherNet/IP with Dual Ethernet Ports
		DNT DeviceNet

Digital Expansion Module

CEP9 - EXP - DIO - 42 - 120

Bulletin Number	Module Type	I/O Type	I/O Count	Communication Type
CEP9 Overload Relay	EXP Expansion Module	DIO Digital I/O	42 4 Inputs / 2 Relay Outputs	120 110…120V AC, 50/60 Hz Inputs 240 220…240V AC, 50/60 Hz Inputs 24D 24V DC Inputs

Analog Expansion Module

CEP9 - EXP - AIO - 31

Bulletin Number	Module Type	I/O Type	I/O Count
CEP9 Overload Relay	EXP Expansion Module	AIO Analog I/O	31 3 Universal Analog Inputs / 1 Analog Output

Operator Station

CEP9 - EOS - SCS

Bulletin Number	Module Type	Function Type
CEP9 Overload Relay	EOS Operator Station	SCS Starter Control Station SDS Starter Diagnostic Station

Power Supply

CEP9 - EXP - PS - AC

Bulletin Number	Module Type	Function Type	Supply Voltage
CEP9 Overload Relay	EXP Expansion Module	PS Expansion Bus Power Supply	AC 110-240V AC, 50/60Hz control voltage DC 24V DC control voltage

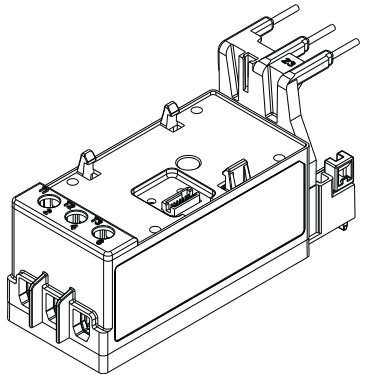
Module Description

The CEP9 Electronic Overload Relay is comprised of three modules. All three modules are required to make a functional overload relay.

- Sensing Module
- Control Module
- Communication Module

Sensing Module

Figure 1 - Sensing Module



The sensing module electronically samples the current, voltage, power, and energy data consumed by the electric motor internal to the module. Users can pick from one of three varieties of the sensing modules depending on the motor diagnostic information that is needed for the motor protection application:

- Current Sensing
- Current and Ground Fault Current Sensing
- Current, Ground Fault Current, Voltage, and Power Sensing

The current ranges for each of three varieties of sensing module are shown below:

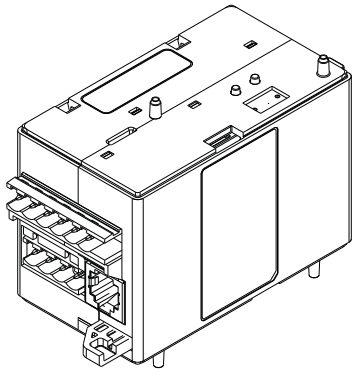
- 0.5...30 A
- 6...60 A
- 10...100 A
- 20...200 A

Users can choose how the sensing module mechanically mounts inside the electrical enclosure. The following mounting mechanisms are available for the sensing module.

- Mount to the load side of a Sprecher + Schuh CA7 Contactor
- DIN Rail / Panel Mount with power terminals
- Replacement DIN Rail / Panel Mount with power terminals for a Sprecher + Schuh CEP7 panel mount adapter
- DIN Rail / Panel Mount with pass-thru power conductors

Control Module

Figure 2 - Control Module



The control module is the heart of the CEP9 Electronic Overload Relay and can attach to any sensing module. The control module performs all of the protection and motor control algorithms and contains the native I/O for the system. The control module has two varieties:

- I/O only
- I/O and protection (PTC & External Ground Fault Current Sensing)

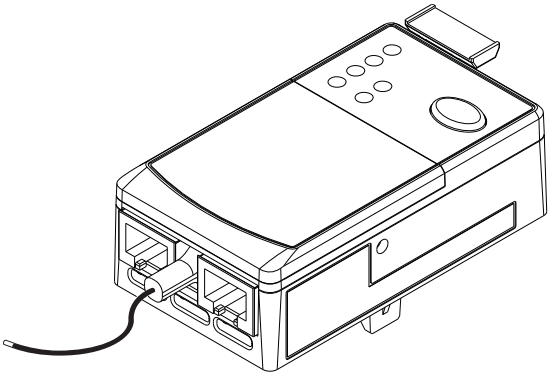
The control module is offered in three control voltages:

- 110...120V AC, 50/60Hz
- 220...240V AC, 50/60Hz
- 24V DC

External control voltage is required to power the CEP9 Electronic Overload Relay and activate the digital inputs.

Communication Module

Figure 3 - Communication Module



The communication module allows the CEP9 Electronic Overload Relay to be integrated into an automation system, and it can attach to any control module. All communication modules allow the user to set the node address with rotary

turn dials, and it provides diagnostic LEDs to provide system status at the panel. The CEP9 Electronic Overload Relay supports two network protocols:

- EtherNet/IP
- DeviceNet

The CEP9 EtherNet/IP Communication Module has two RJ-45 connectors that function as a switch. Users can daisy chain multiple CEP9 Electronic Overload Relays with Ethernet cable, and the module supports a Device Level Ring (DLR).

Optional Add-On Modules

Optional Expansion I/O

The CEP9 Electronic Overload Relay allows the user to add additional digital and analog I/O to the system via the CEP9 Electronic Overload Relay Expansion Bus if the native I/O count is not sufficient for the application on the base relay. Users can add up to four additional Digital I/O Expansion Modules that have 4 inputs (120V AC, 240V AC, or 24V DC) and 2 relay outputs.

Users can also add up to four additional Analog I/O Expansion Modules, which have three independent universal analog inputs and one isolated analog output. The independent universal analog inputs can accept the following signals:

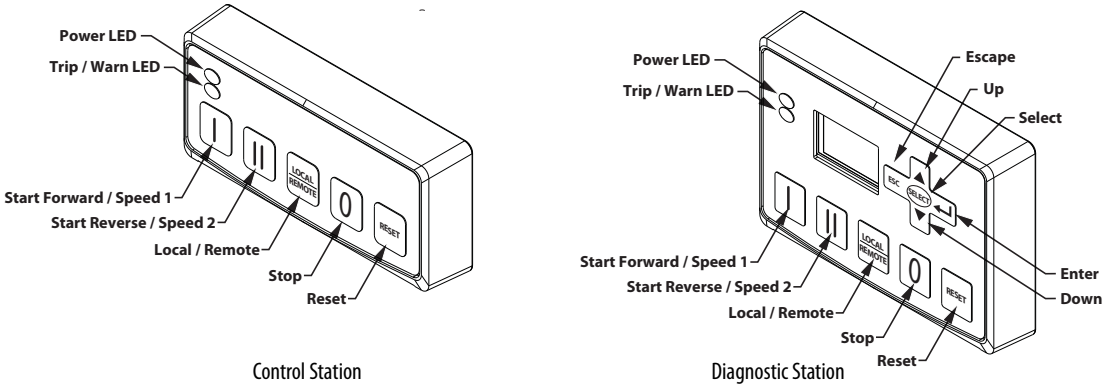
- 4...20 mA
- 0...20 mA
- 0...10V DC
- 1...5V DC
- 0...5V DC
- RTD Sensors (Pt, Cu, Ni, & NiFe)
- NTC Sensors

The isolated analog output can be programmed to reference a traditional analog signal (4...20 mA, 0...20 mA, or 0...10V DC) to represent the following diagnostic values:

- Average %FLA
- %TCU
- Ground Fault Current
- Current Imbalance
- Average L-L Voltage
- Voltage Imbalance
- Total kW
- Total kVAR
- Total kVA
- Total Power Factor
- User Defined Value

Optional Operator Station

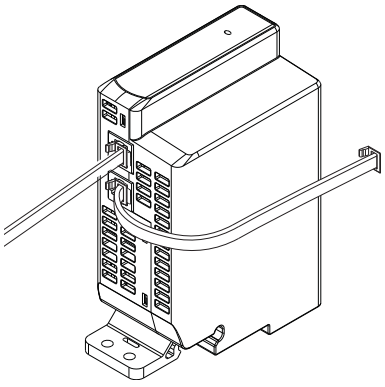
Figure 4 - Operator Stations



The CEP9 Electronic Overload Relay offers the user the capability to add one operator interface to the Expansion Bus. There are two types of operator stations that the user can chose from: control station or a diagnostic station. Both types of operator stations mount into a standard 22 mm push button knockout, and they provide diagnostic LEDs which allow the user to view the status of the CEP9 Electronic Overload Relay from the outside of an electrical enclosure. Both operator stations provide push buttons which can be used for motor control logic, and they both can be used to upload and download parameter configuration data from the base relay. The diagnostic station contains a display and navigation buttons that allows the user to view and edit parameters in the base relay.

Optional Expansion Bus Power Supply

Figure 5 - Expansion Bus Power Supply



The CEP9 Electronic Overload Relay expansion bus provides enough current to operate a system that has (1) Digital Expansion Module and (1) Operator Station. An CEP9 Electronic Overload Relay system that contains more expansion modules will need supplemental current for the Expansion Bus. The CEP9 Electronic Overload Relay offers users two types of Expansion Bus Power Supplies: AC (110...240V AC, 50/60 Hz) and DC (24V DC). One Expansion Bus Power Supply supplies enough current for a fully loaded CEP9 Electronic

Overload Relay Expansion Bus (four Digital Expansion Modules, four Analog Expansion Modules, and one Operator Station).

Protection Features

Standard Current-Based Protection

All versions of the CEP9 Electronic Overload Relay provide the following motor protection functions:

- Thermal Overload (51)
- Phase Loss
- Current Imbalance (46)
- Undercurrent – load loss (37)
- Overcurrent – load jam (48)
- Overcurrent – load stall
- Start Inhibit (66)

Ground Fault Current Based Protection

The CEP9 Electronic Overload Relay sensing modules and control modules with a ground fault current option provides the following motor protection function:

- Ground Fault – zero sequence method (50N)

Voltage and Power Based Protection

The CEP9 Electronic Overload Relay sensing modules with voltage sensing provides the following motor protection functions:

- Undervoltage (27)
- Overvoltage (59)
- Phase Reversal (47) – voltage based
- Over and Under Frequency (81) – voltage based
- Voltage Imbalance (46)
- Over and Under Power (37)
- Over and Under Leading/Lagging Power Factor (55)
- Over and Under Reactive Power Generated
- Over and Under Reactive Power Consumed
- Over and Under Apparent Power

Applications:

The CEP9 Electronic Overload Relay can be used with the following across the line starter applications:

- Non-Reversing Starter
- Reversing Starter
- Wye (Star) / Delta Starter
- Two-speed Motors
- Low and Medium Voltage with 2 or 3 Potential Transformers
- With or Without Phase Current Transformers
- With or Without Zero-sequence Core Balanced Current Transformer

Installation and Wiring

Introduction

This chapter provides instructions for receiving, unpacking, inspecting, and storing the CEP9 Electronic Overload Relay. Assembly, installation, and wiring instructions for common applications are also included in this chapter.

Receiving

It is the responsibility of the user to thoroughly inspect the equipment before accepting the shipment from the freight company. Check the item(s) received against the purchase order. If any items are damaged, it is the responsibility of the user not to accept delivery until the freight agent has noted the damage on the freight bill. Should any concealed damage be found during unpacking, it is again the responsibility of the user to notify the freight agent. The shipping container must be left intact and the freight agent should be requested to make a visual inspection of the equipment.

Unpacking/Inspecting

Remove all packing material from around the CEP9 Electronic Overload Relay. After unpacking, check the item's nameplate catalog number against the purchase order.

Storing

The CEP9 Electronic Overload Relay should remain in its shipping container prior to installation. If the equipment is not to be used for a period of time, it must be stored according to the following instructions in order to maintain warranty coverage:

- Store in a clean, dry location.
- Store within an ambient temperature range of -40...+85 °C (-40...+185 °F).
- Store within a relative humidity range of 0...95%, non-condensing.
- Do not store where the device could be exposed to a corrosive atmosphere.
- Do not store in a construction area.

General Precautions

If the CEP9 Electronic Overload Relay is being deployed in an environment with an ambient temperature greater than 30 °C (86 °F), please refer to the Environmental Specifications on page 325 for the appropriate temperature derating. In addition to the specific precautions listed throughout this manual, the following general statements must be observed.

ATTENTION: The CEP9 Electronic Overload Relay contains electrostatic discharge (ESD) sensitive parts and assemblies. Status control precautions are required when installing, testing, servicing, or repairing this assembly. Component damage may result if ESD control procedures are not followed.

ATTENTION: An incorrectly applied or installed CEP9 Electronic Overload Relay can result in damage to the components or reduction in product life. Wiring or application errors (e.g., incorrectly figuring the FLA setting, supplying incorrect or inadequate supply voltage, connecting an external supply voltage to the thermistor terminals, or operating or storing in excessive ambient temperatures) may result in malfunction of the CEP9 Electronic Overload Relay.

ATTENTION: Only personnel familiar with the CEP9 Electronic Overload Relay and associated machinery should plan to install, start up, and maintain the system. Failure to comply may result in personal injury or equipment damage.

ATTENTION: The purpose of this user manual is to serve as a guide for proper installation. The National Electrical Code (NEC) and any other governing regional or local code will overrule this information. Rockwell Automation cannot assume responsibility for the compliance or proper installation of the CEP9 Electronic Overload Relay or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

ATTENTION: The earth ground terminal of the CEP9 Electronic Overload Relay shall be connected to a solid earth ground via a low-impedance connection.

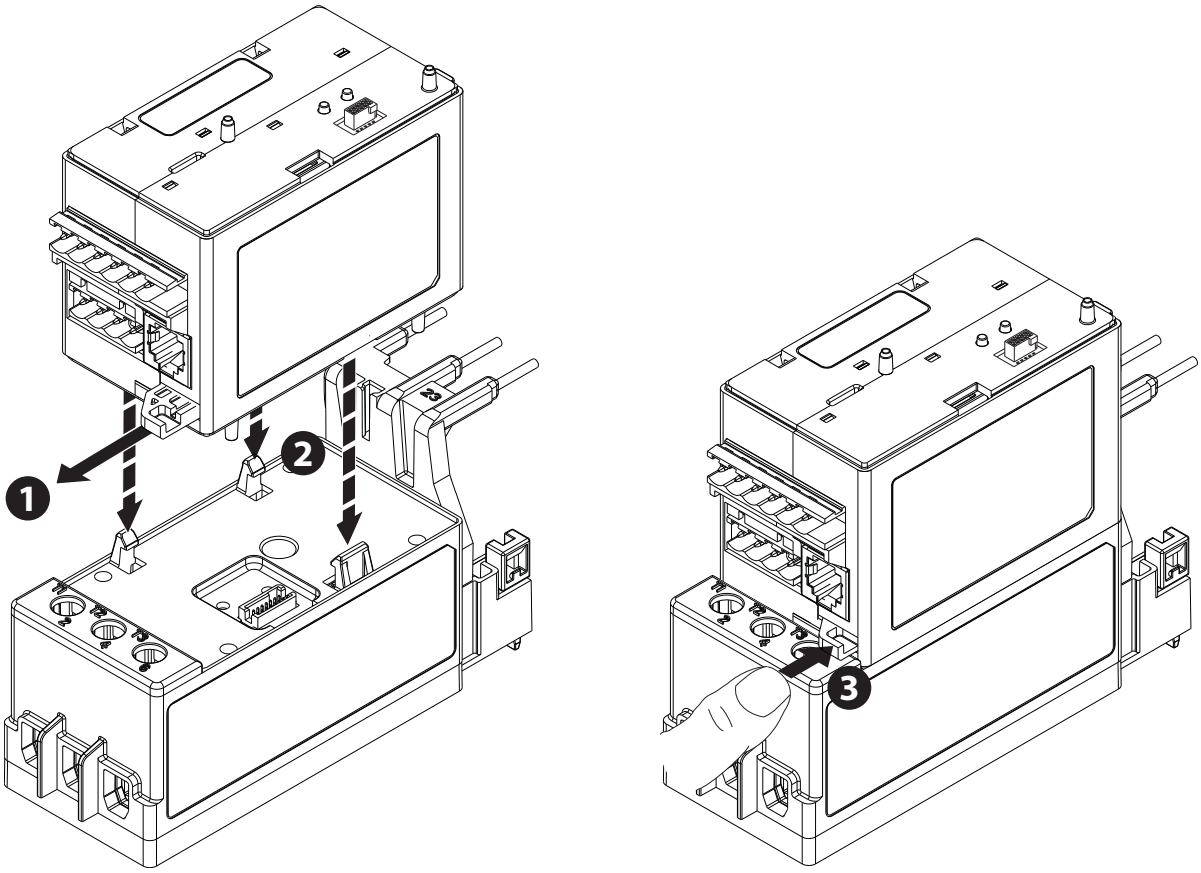
Base Relay Assembly

The following section illustrates the CEP9 Electronic Overload Relay base relay assembly instructions.

Control Module to Sensing Module Assembly

Any CEP9 Control Module can connect to any CEP9 Sensing Module. The illustrations below show the steps required to make this connection.

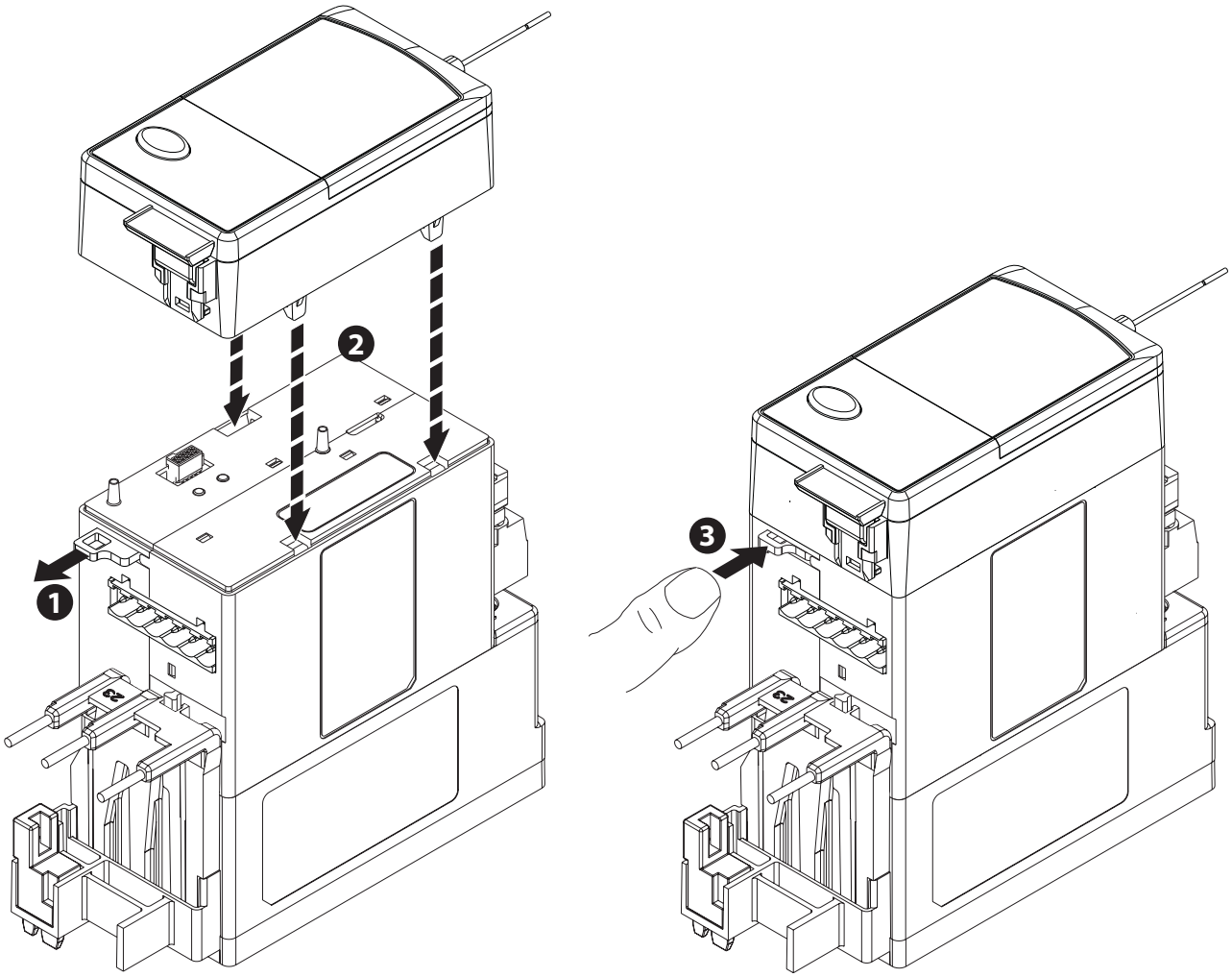
Figure 6 - Control Module to Sensing Module Assembly



Communication Module to Control Module Assembly

Any CEP9 Communication Module can connect to any CEP9 Control Module. The illustrations below show the steps required to make this connection.

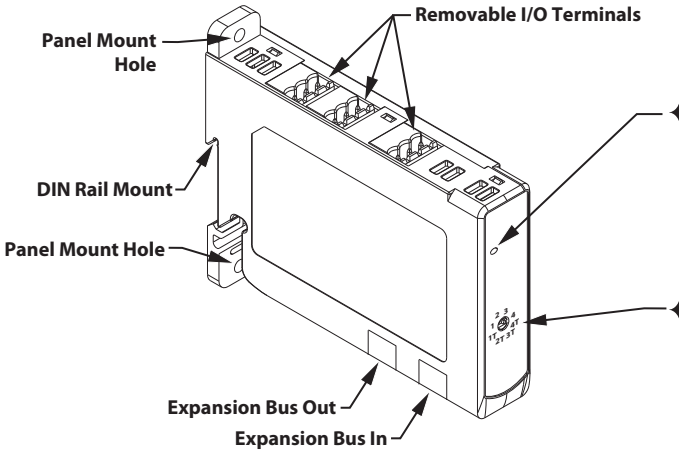
Figure 7 - Communication Module to Control Module Assembly



Expansion Bus Peripherals

The CEP9 Electronic Overload Relay offers a range of Expansion Digital and Analog I/O modules that simply connect to the CEP9 Electronic Overload Relay's Expansion Bus.

Figure 8 - Expansion Bus Peripherals



Status LED

Color	Description
Off	No power applied
Blinking Green	Module OK with no connection
Green	Module OK and active
Red	Error Detected

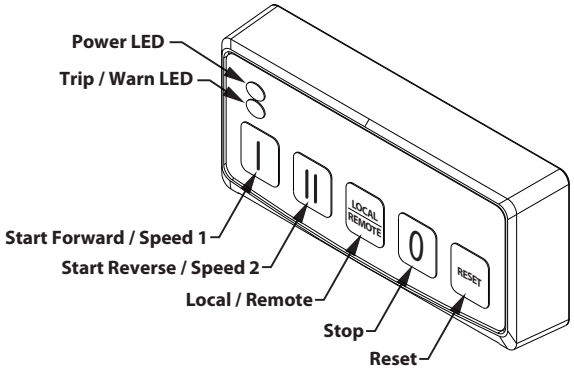
Module Number Selector

Number	Description
1 - 4	Module number
1T - 4T	Module number with expansion bus terminating resistor applied

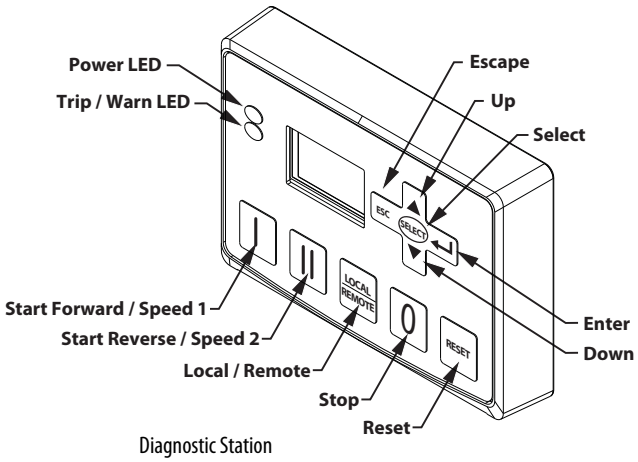
Note: If the expansion bus does not have an operator station, then the last expansion module number must be set to terminated.

Users can also add one of the two available operator stations to the end of the Expansion Bus.

Figure 9 - Expansion Operator Stations



Control Station

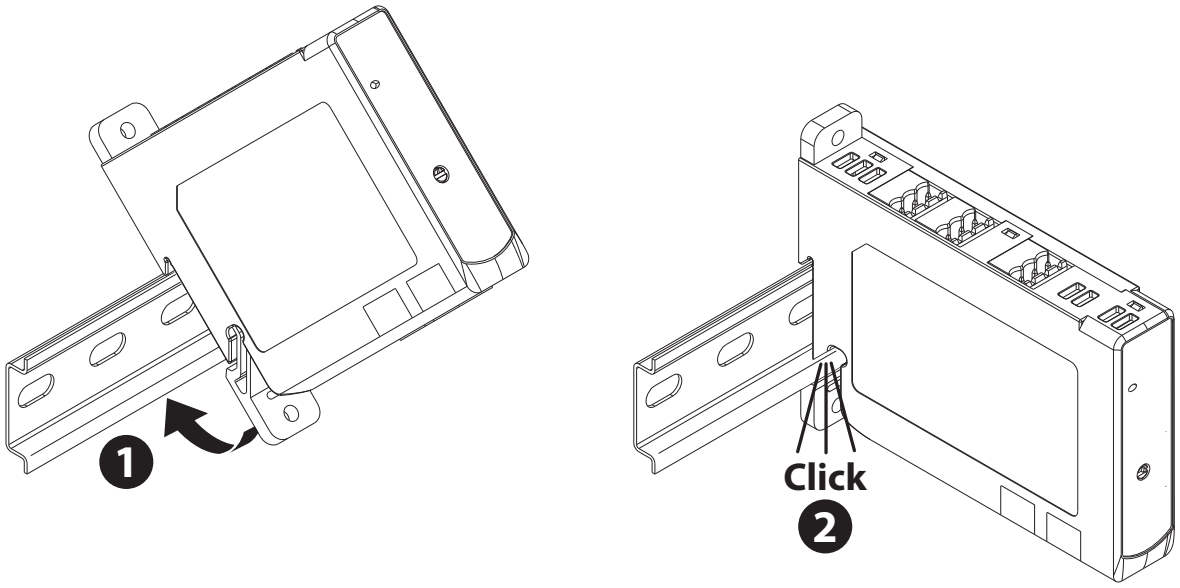


Diagnostic Station

The following illustrations show how to mount and connect the CEP9 Electronic Overload Relay expansion bus I/O modules, expansion power supplies, and operator stations.

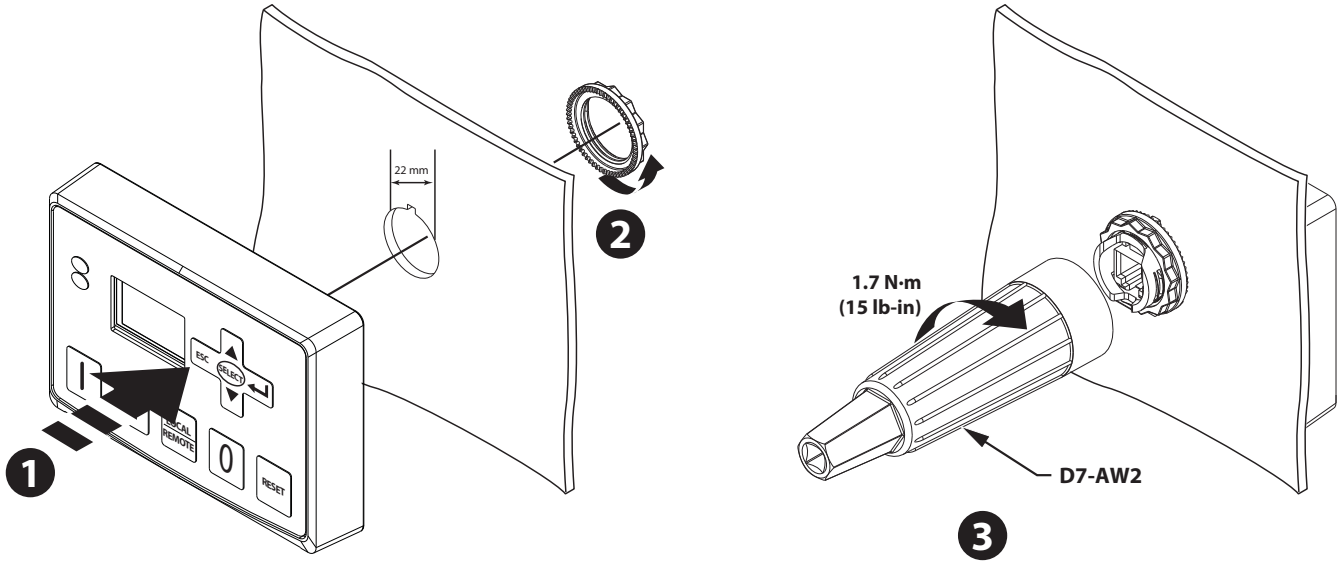
Expansion Bus Digital & Analog I/O Modules and Power Supply Installation

Figure 10 - Expansion Bus Digital& Analog I/O Modules and Power Supply



Expansion Bus Operator Station Installation

Figure 11 - Expansion Bus Operator Station



Expansion Bus Network Installation

The CEP9 Electronic Overload Relay will support up to (4) Expansion Digital I/O modules, (4) Expansion Analog I/O modules, and (1) Operation Station. The CEP9 Base Relay can supply enough power for (1) Expansion Digital I/O module and (1) Operator Station. Any other combination of CEP9 Expansion

Bus peripherals will require an Expansion Bus Power Supply which connects as the first module on the Expansion Bus.

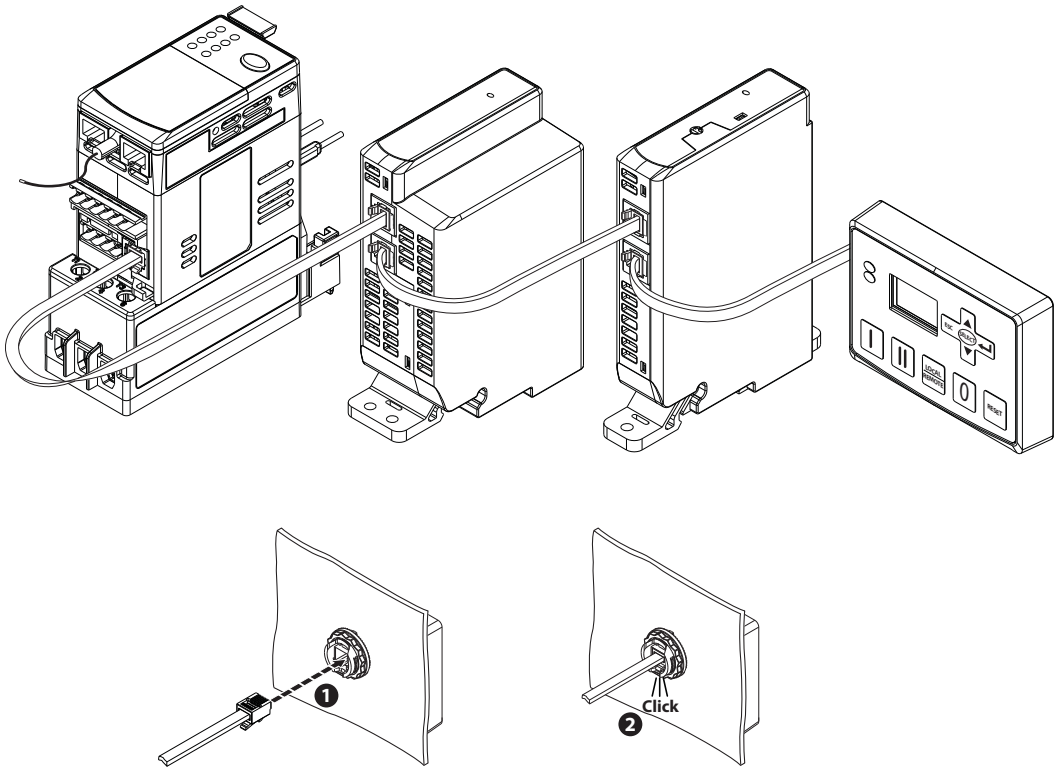
Users will set the module number dial of the Expansion Digital Module to a unique digital module number (1-4). If the Expansion Digital Module is the last device on the Expansion Bus, set the module number to the value that enables in the internal terminating resistor (1T-4T). A power cycle is required when changes are made to the module number dial.

Users will set the module number dial of the Expansion Analog Module to a unique analog module number (1-4). If the Expansion Analog Module is the last device on the Expansion Bus, set the module number to the module number value that enables in the internal terminating resistor (1T-4T). A power cycle is required when changes are made to the module number dial.

Users will connect the CEP9 Base Relay to the Expansion Module's Input Port using the supplied Expansion Bus cable. Users will add the next Expansion Module by connecting the supplied Expansion Bus cable to the Output Port of the previous Expansion Module and into the Input Port of the additional Expansion Module. The Operator Station is the last device on the CEP9 Expansion Bus; it only has an Input Port with an internal Expansion Bus terminating resistor.

If the user supplied Expansion Bus cable is not long enough for the installation, 1-meter (Cat. No. CEP9-EXP-CBL-1M) and 3-meter (Cat. No. CEP9-EXP-CBL-3M) Expansion Bus cables are available as accessories. The CEP9 expansion bus can support a maximum distance of 5 meters (16 ft.).

Figure 12 - Expansion Bus Network Installation



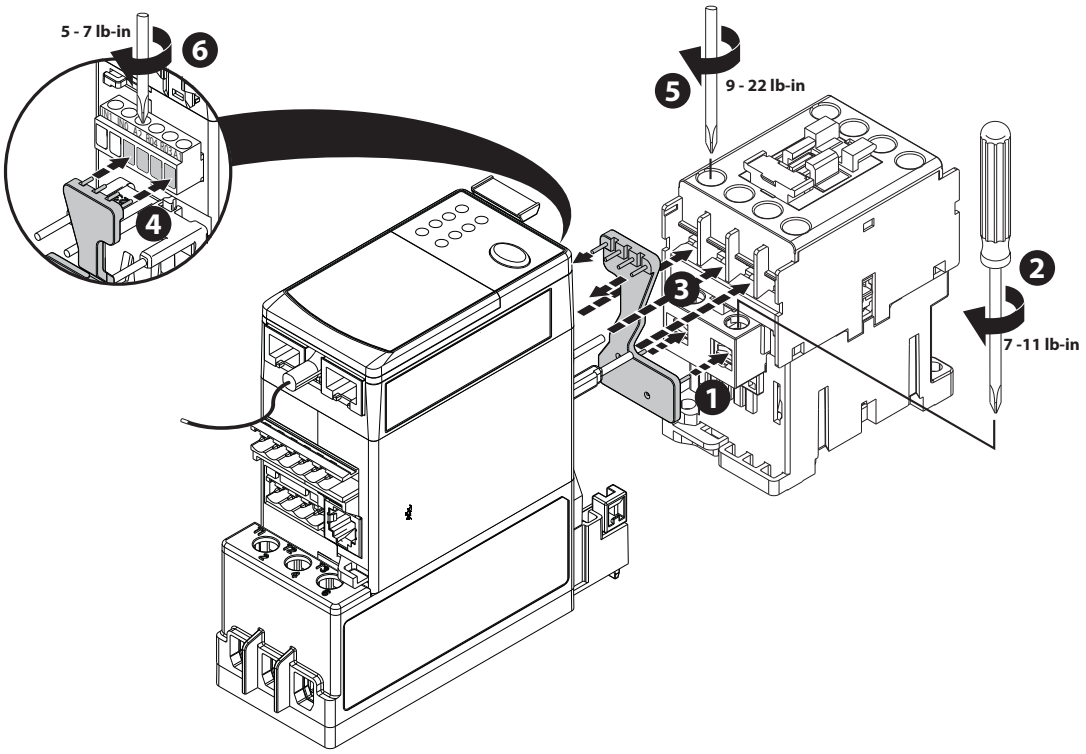
Starter Assembly

The following illustrations show how to assemble an CEP9 Electronic Overload Relay as a motor starter with a Sprecher + Schuh CA7 contactor.

CA7-9…-55 Starter Assembly Installation

The starter assembly installation instructions are for use with CEP9 Sensing Module catalog numbers CEP9-ESM-___-23-___ and CEP9-ESM-___-55-___

Figure 13 - CA7-9…-55 Starter Assembly Installation



Starter Dimensions

Approximate dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

Figure 14 - CEP9 Sensing Module CEP9-ESM-____-23-__ with CA7-9…-23 Contactor

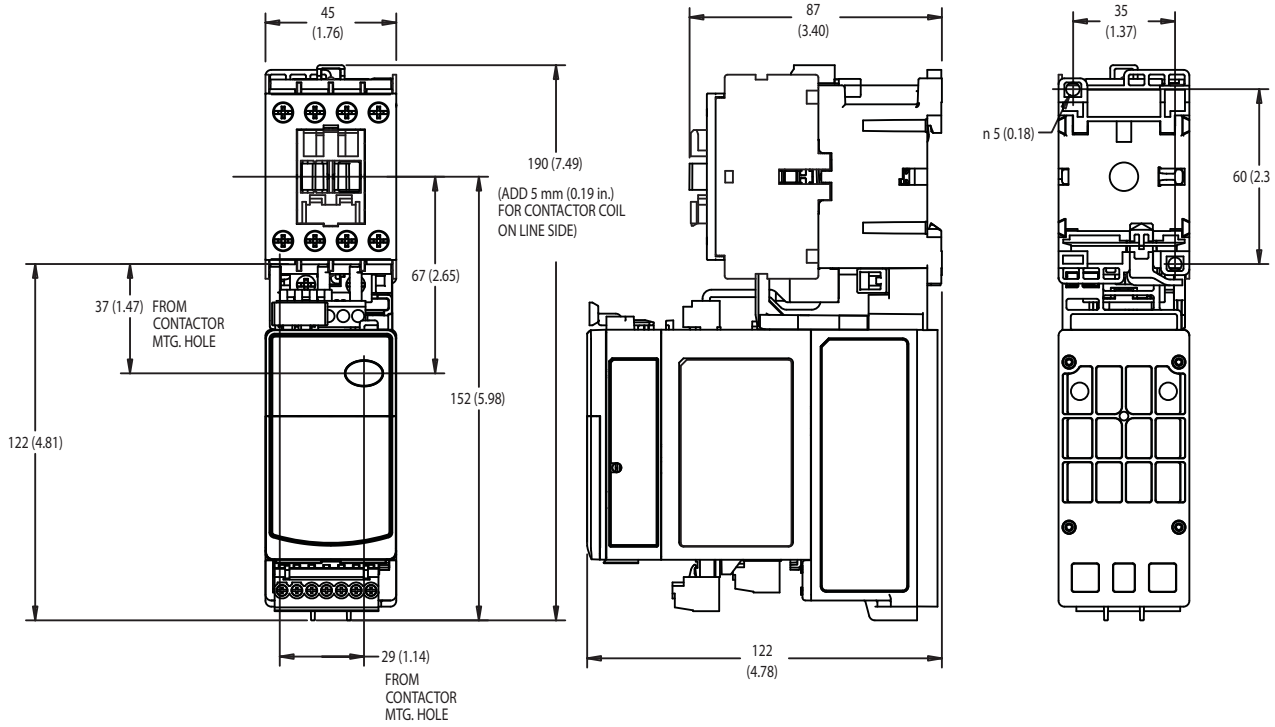


Figure 15 - CEP9 Sensing Module CEP9-ESM-____-__-C55 with CA7-30…-37 Contactor

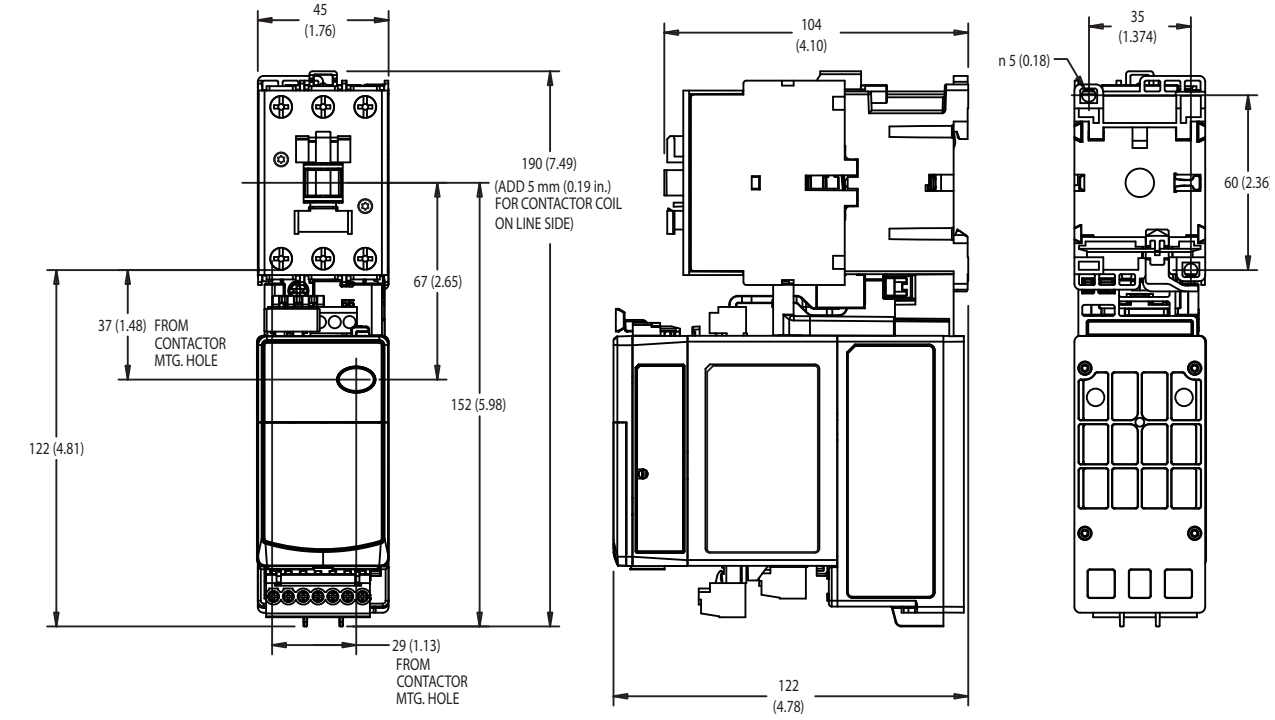
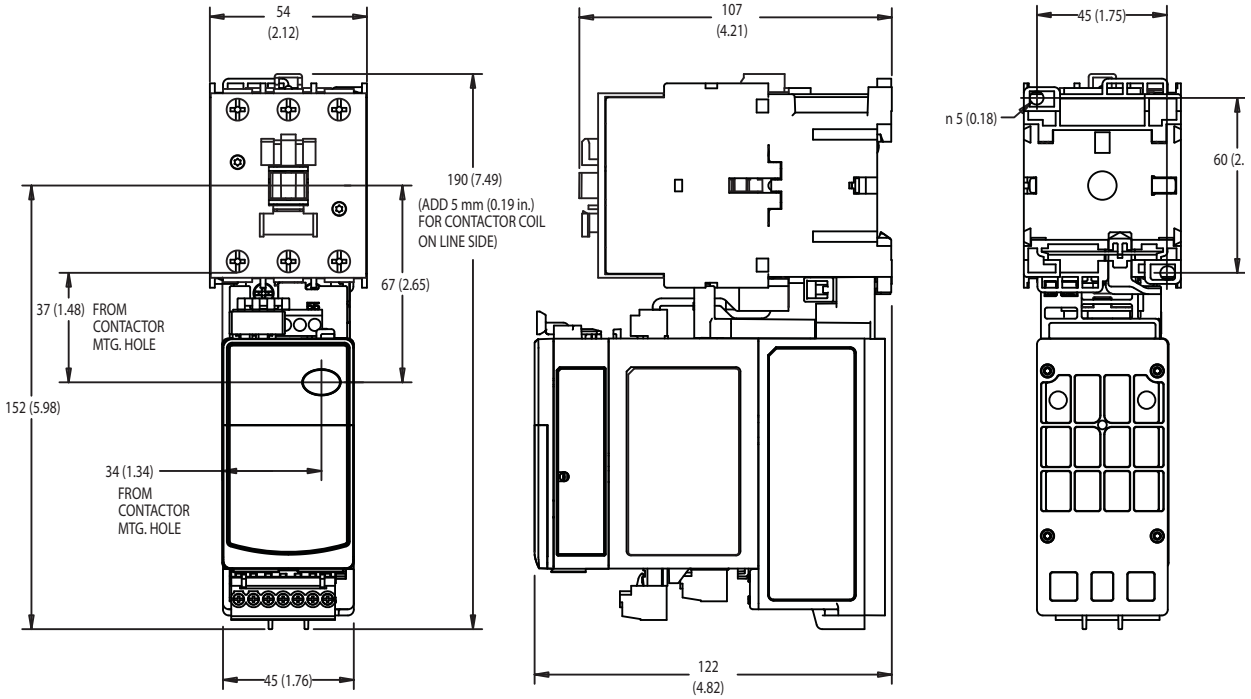


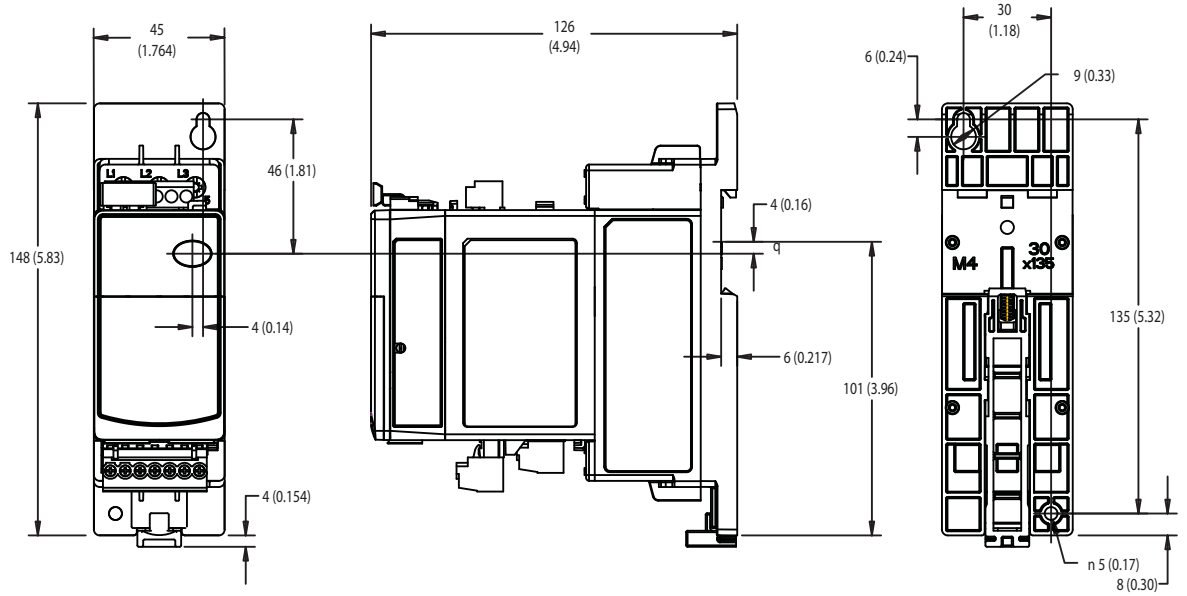
Figure 16 - CEP9 Sensing Module CEP9-ESM-____-55-__ with CA7-43…-55 Contactor



DIN Rail / Panel Mount Dimensions

Approximate dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

Figure 17 - CEP9 Sensing Module CEP9-ESM-____7T-30 and CEP9-ESM-____-7T-60



Expansion Bus Peripherals Dimensions

Approximate dimensions are shown in millimeters. Dimensions are not intended to be used for manufacturing purposes.

Figure 18 - CEP9 Digital Expansion Module CEP9-EXP-DIO-___

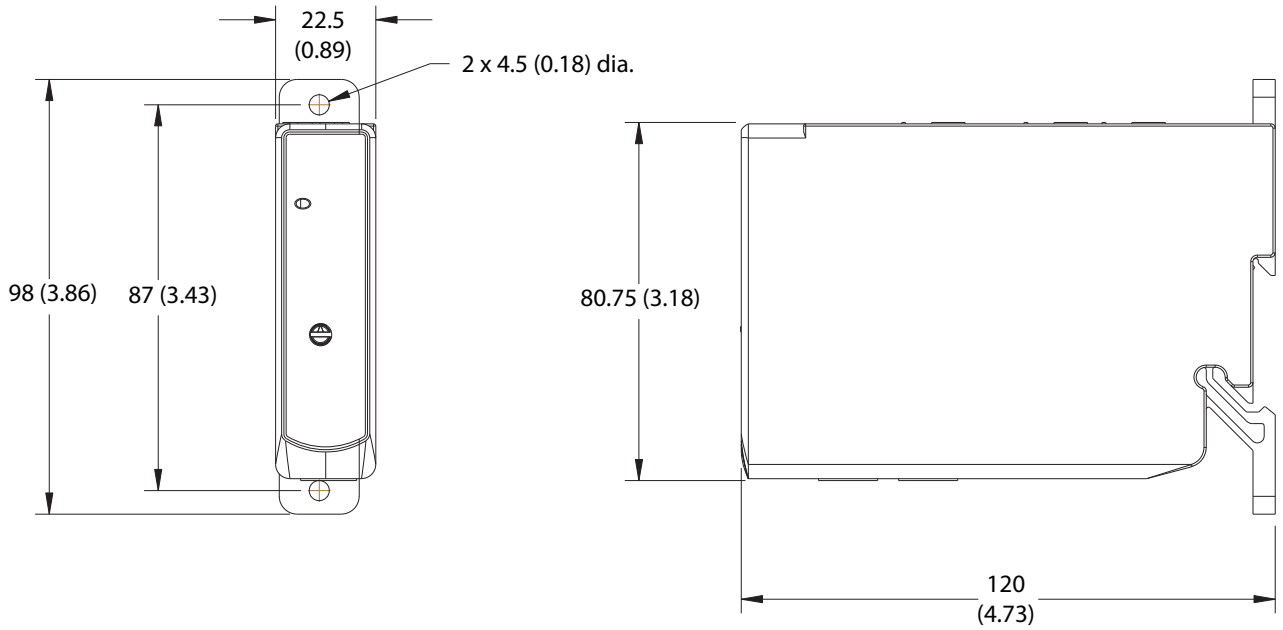


Figure 19 - CEP9 Expansion Analog Module CEP9-EXP-AIO

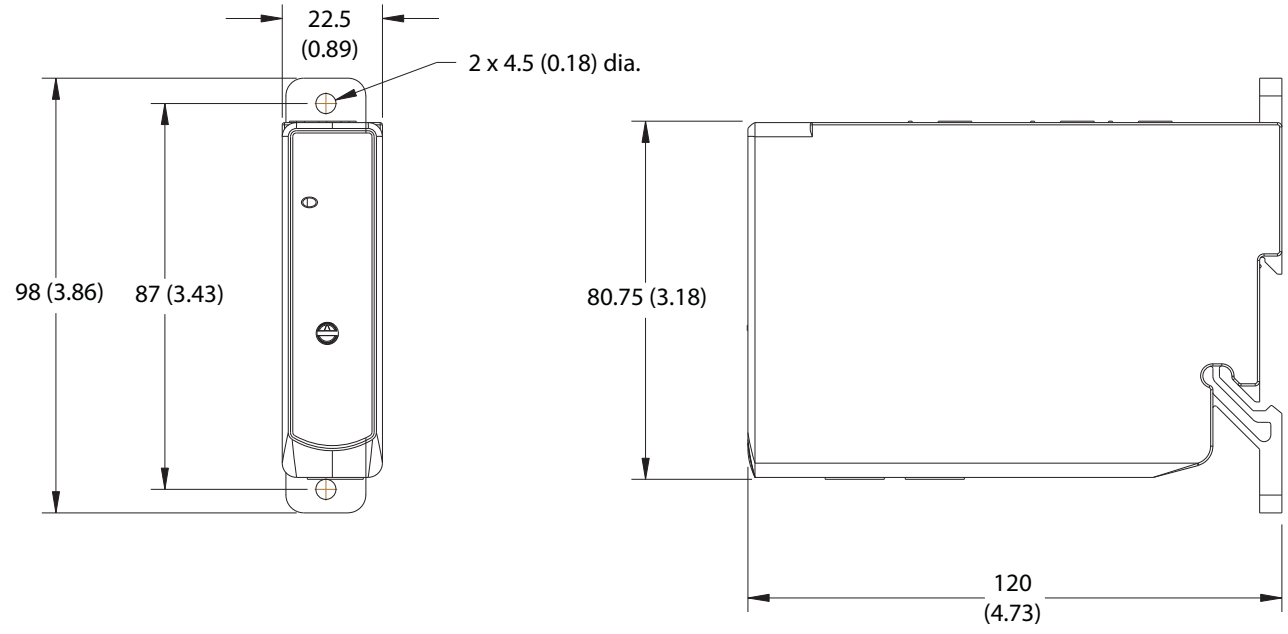


Figure 20 - CEP9 Expansion Power Supply CEP9-EXP-PS-____

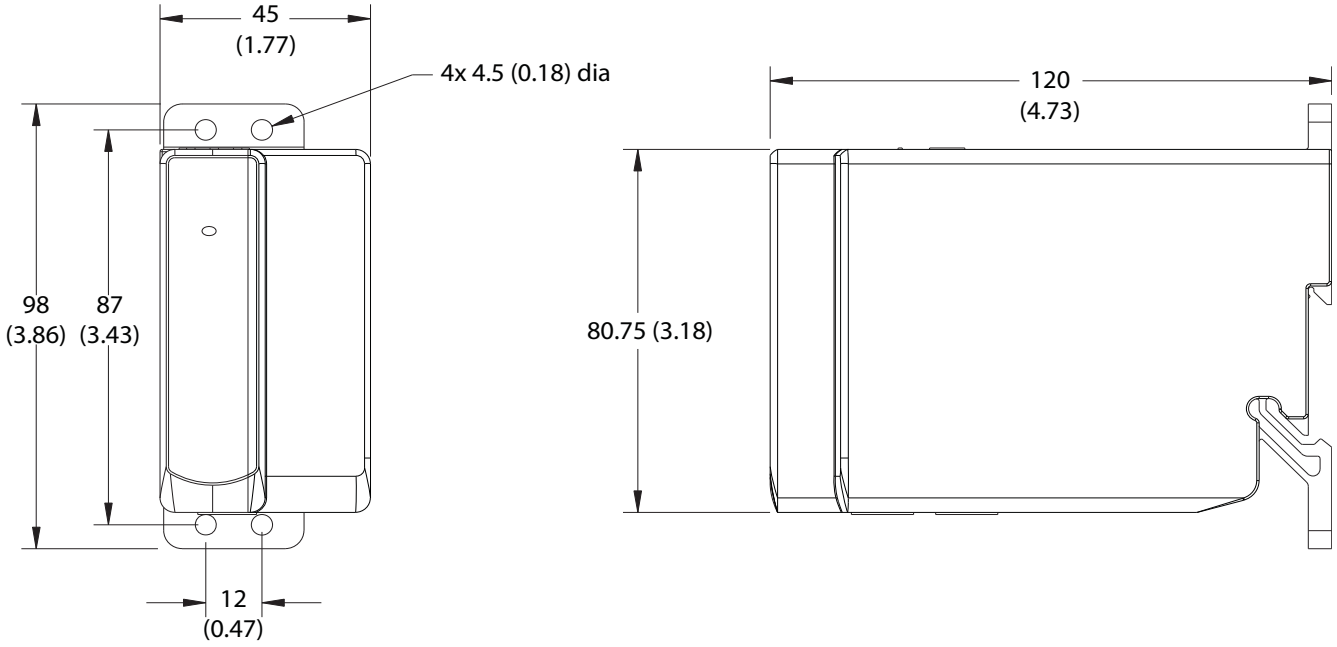


Figure 21 - CEP9 Starter Control Station CEP9-EOS-SCS

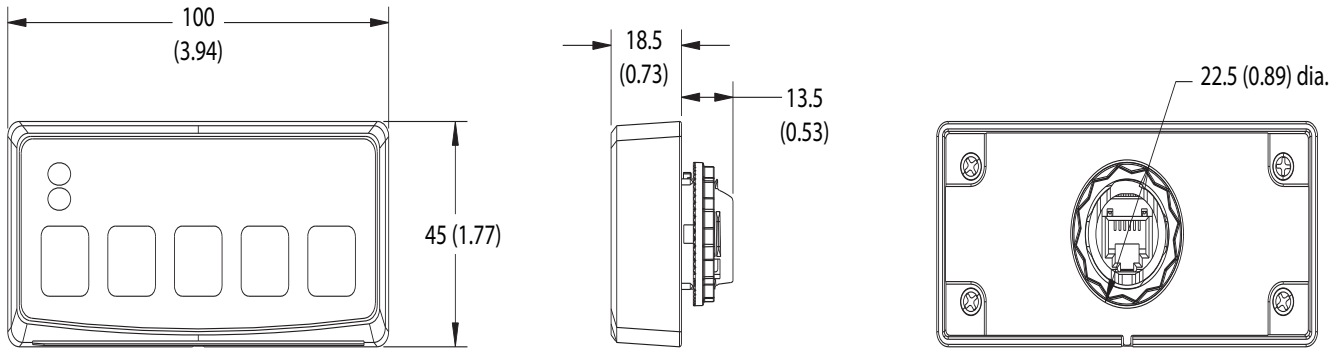
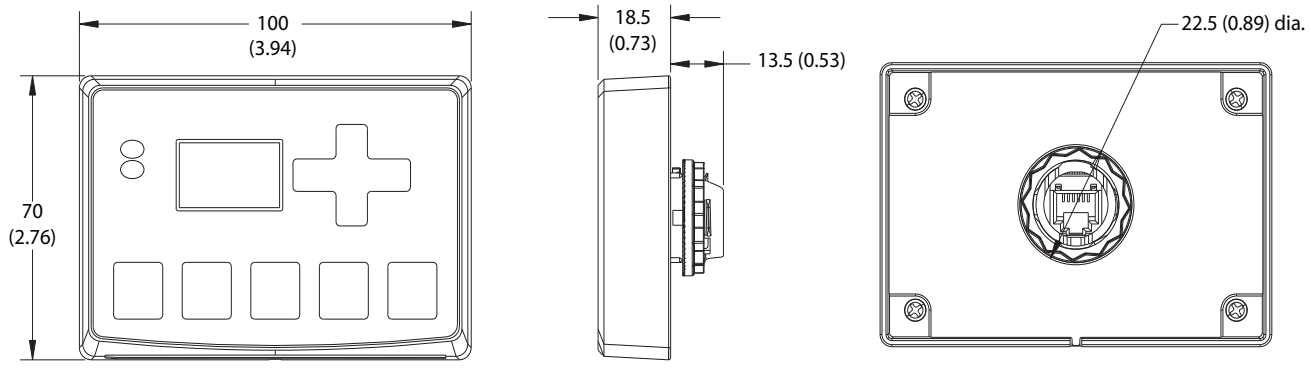


Figure 22 - CEP9 Starter Diagnostic Station CEP9-EOS-SDS



Terminals

Sensing Module

Table 1 - CEP9 Sensing Module Wire Size and Torque Specifications

Wire Type	Conductor Torque	Cat. No.	
		CEP9-ESM-_ _ _-_ _ _-30 **CEP9-ESM-_ _ _-_ _ _-60**	**CEP9-ESM-_ _ _-_ _ _-100**
Stranded/Solid [AWG]	Single	#14…6 AWG 22 lb-in.	#12…1 AWG 35 lb-in.
	Multiple	#10…6 AWG 30 lb-in.	#6…2 AWG 35 lb-in.
Flexible-Stranded with Ferrule Metric	Single	2.5…16 mm2 2.5 N•m	4…35 mm2 4 N•m
	Multiple	6…10 mm2 3.4 N•m	4…25 mm2 4 N•m
Coarse-Stranded/Solid Metric	Single	2.5…25 mm2 2.5 N•m	4…50 mm2 4 N•m
	Multiple	6…16 mm2 3.4 N•m	4…35 mm2 4 N•m

Control Module

Figure 23 - CEP9 Control Module Terminal Designations

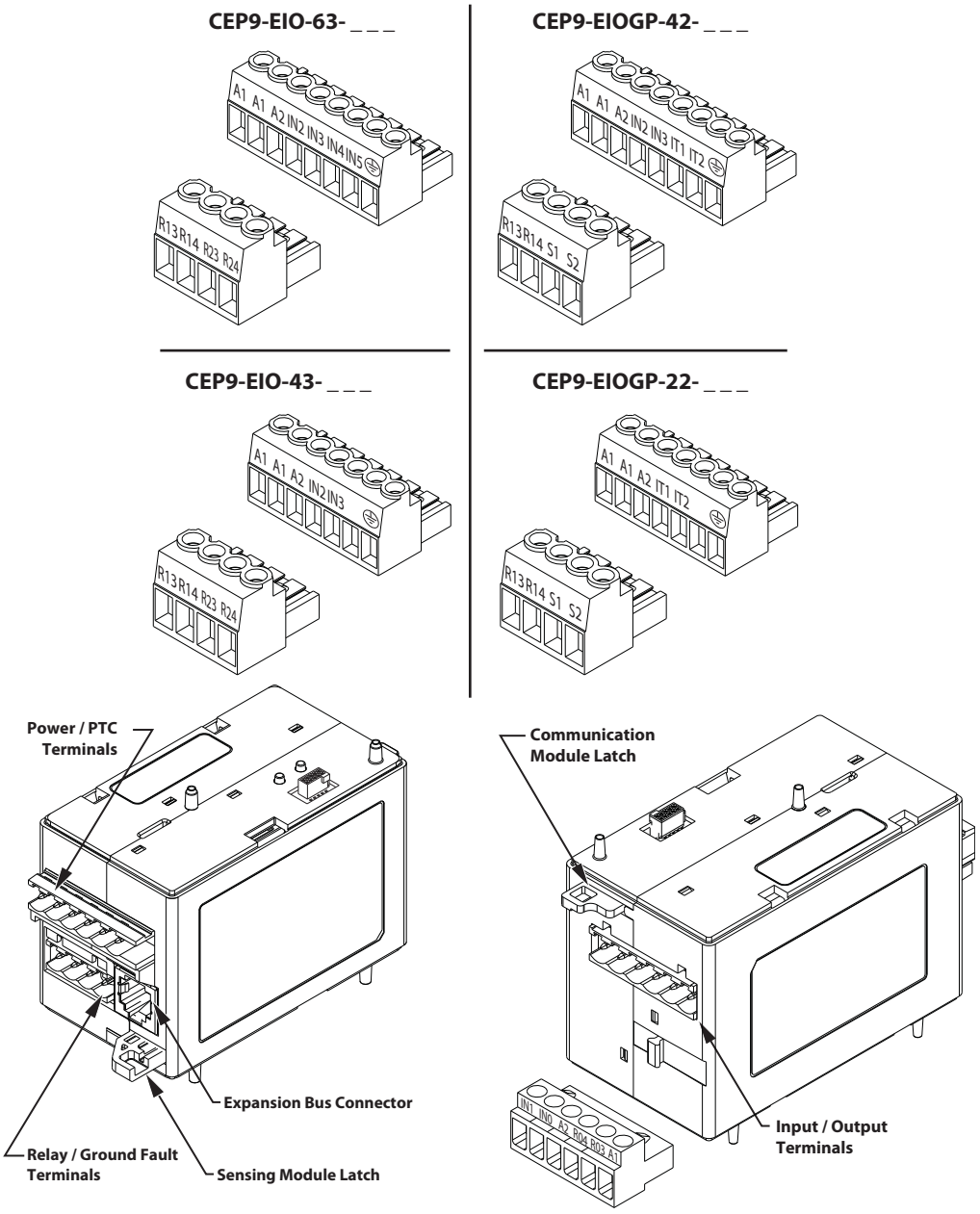
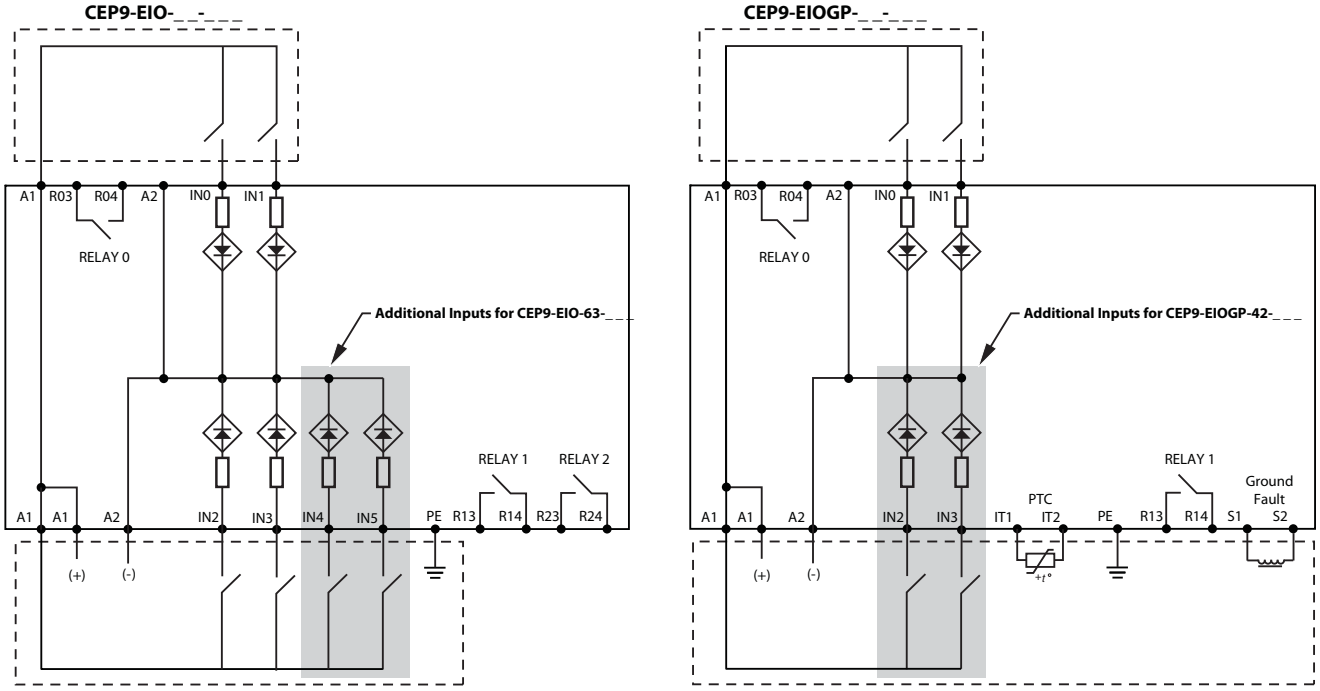

CEP9-EIO-63- _ _ _
A1 A1 A2 IN2 IN3 IN4 IN5
R13 R14 R23 R24
CEP9-EIOGP-42- _ _ _
A1 A1 A2 IN2 IN3 IT1 IT2
R13 R14 S1 S2
CEP9-EIO-43- _ _ _
A1 A1 A2 IN2 IN3
R13 R14 R23 R24
CEP9-EIOGP-22- _ _ _
A1 A1 A2 IT1 IT2
R13 R14 S1 S2
Power / PTC Terminals
Expansion Bus Connector
Relay / Ground Fault Terminals
Sensing Module Latch
Communication Module Latch
Input / Output Terminals

Table 2 - CEP9 Control Module Wire Size and Torque Specifications

Wire Type	Conductor Torque	Cat. No. CEP9-EIO-_ _-_ _ _ CEP9-EIOGP-_ _-_ _ _
Stranded/Solid [AWG]	Single	24...12 AWG
	Multiple (stranded only)	24...16 AWG 5 lb-in
Flexible-Stranded with Ferrule Metric	Single	0.25 . . . 2.5 mm^2
	Multiple	0.5...0.75 mm^2 0.55 N•m
Coarse-Stranded/Solid Metric	Single	0.2...2.5 mm^2
	Multiple	0.2...1.5 mm^2 0.55 N•m

Figure 24 - Control Module Wiring



Expansion Digital Module

Figure 25 - CEP9 Expansion Digital Module Terminal Designations

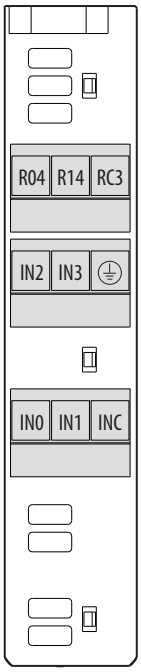
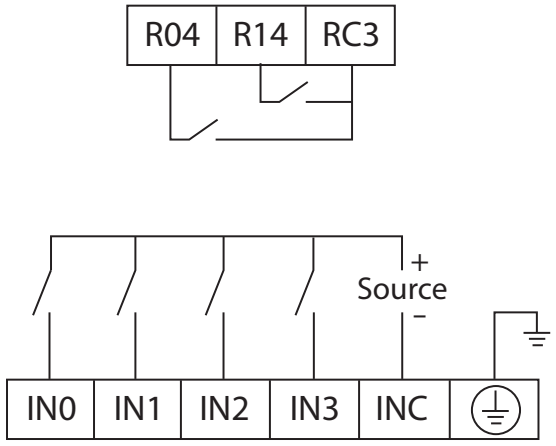


Table 3 - CEP9 Expansion Digital Module Wire Size and Torque Specifications

Wire Type	Conductor Torque	Cat. No. CEP9-EXP-DIO-42-_ _ _
Stranded/Solid [AWG]	Single	24...12 AWG
	Multiple (stranded only)	24...16 AWG 5 lb-in
Flexible-Stranded with Ferrule Metric	Single	0.25. . .2.5 mm^2
	Multiple	0.5...0.75 mm^2 0.55 N•m
Coarse-Stranded/Solid Metric	Single	0.2...2.5 mm^2
	Multiple	0.2...1.5 mm^2 0.55 N•m

Figure 26 - CEP9 Expansion Digital Module Wiring Diagram



Expansion Analog Module

Figure 27 - CEP9 Expansion Analog Module Terminal Designations

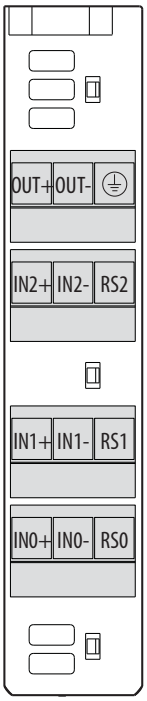
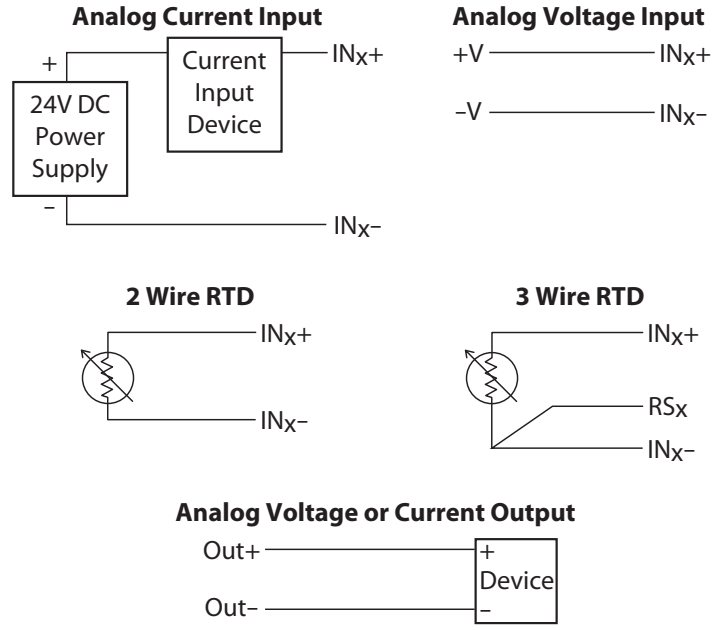


Table 4 - CEP9 Expansion Analog Module Wire Size and Torque Specifications

Wire Type	Conductor Torque	Cat. No. CEP9-EXP-AIO-31
Stranded/Solid [AWG]	Single	24...12 AWG
	Multiple (stranded only)	24...16 AWG 5 lb-in
Flexible-Stranded with Ferrule Metric	Single	0.25. . .2.5 mm^2
	Multiple	0.5...0.75 mm^2 0.55 N•m
Coarse-Stranded/Solid Metric	Single	0.2...2.5 mm^2
	Multiple	0.2...1.5 mm^2 0.55 N•m

Figure 28 - CEP9 Expansion Analog I/O Modules CEP9-EXP-AIO-__



Expansion Power Supply

Figure 29 - CEP9 Expansion Power Supply Terminal Designations

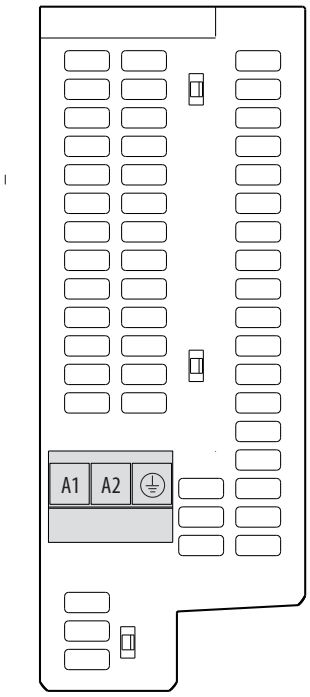
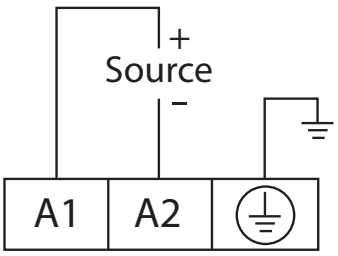


Table 5 - CEP9 Expansion Power Supply Wire Size and Torque Specifications

Wire Type	Conductor Torque	Cat. No. CEP9-EXP-PS-_ _
Stranded/Solid [AWG]	Single	24...12 AWG
	Multiple (stranded only)	24...16 AWG 5 lb-in
Flexible-Stranded with Ferrule Metric	Single	0.25 . . .2.5 mm^2
	Multiple (stranded only)	0.5...0.75 mm^2 0.55 N•m
Coarse-Stranded/Solid Metric	Single	0.2...2.5 mm^2
	Multiple (stranded only)	0.2...1.5 mm^2 0.55 N•m

Figure 30 - CEP9 Expansion Power Supply Wiring Diagram



Grounding

The following grounding recommendations are provided to ensure EMC requirements during installation.

- The earth ground terminal of the CEP9 Electronic Overload Relay shall be connected to a solid earth ground via a low-impedance connection.
- Wire the green shield wire of the Cat. No. CEP9-ECM-ETR into the earth ground terminal of the CEP9 control module.
- Installations employing an external ground fault sensor shall ground the cable shield at the sensor with no connection made at the CEP9 Electronic Overload Relay.
- The PTC thermistor cable shield shall be grounded at the CEP9 Electronic Overload Relay with no connection made at the opposite end.

Short-Circuit Ratings

The CEP9 Electronic Overload Relay is suitable for use on circuits capable of delivering not more than the RMS symmetrical amperes listed in the following tables.

Table 6 - Standard Fault Short Circuit Ratings per UL60947-4-1 and CSA 22.2 No. EN60947-4-1

Overload Relay using Sensing Module Cat. No.	Max. Available Fault Current [A]	Maximum Voltage [V]
CEP9-ESM-____-23-30	5,000	600
CEP9-ESM-____-55-30		
CEP9-ESM-____-7T-30		
CEP9-ESM-____-P-30		
CEP9-ESM-____-T-30		
CEP9-ESM-VIG-CT-30		
CEP9-ESM-____-55-60		
CEP9-ESM-____-7T-60		
CEP9-ESM-____-P-60		
CEP9-ESM-____-T-60		

Table 7 - Short Circuit Ratings per EN60947-4-1

Overload Relay using Sensing Module Cat. No.	Prospective Short-Circuit Current, I_r [A]	Conditional Short-Circuit Current, I_q [A]	Maximum Voltage [V]
CEP9-ESM-____-23-30	3,000	100,000	690
CEP9-ESM-____-55-30			
CEP9-ESM-____-7T-30			
CEP9-ESM-____-P-30			
CEP9-ESM-____-T-30			
CEP9-ESM-VIG-CT-30			
CEP9-ESM-____-55-60			
CEP9-ESM-____-7T-60			
CEP9-ESM-____-P-60			
CEP9-ESM-____-T-60			

Table 8 - High Fault Short Circuit Ratings per UL60947-4-1 and CSA 22.2 No. EN60947-4-1 with CA7 contactors protected by fuses

Overload Relay using Sensing Module Cat. No.	Contactor Cat. No.	Max. Starter FLC[A]	Max. Available Fault Current [A]	Max. Voltage [V]	Class C or JJ fuse [A]
CEP9-ESM-____-23-30	CA7-9	9	100,000	600	20
	CA7-12	12			20
	CA7-16	16			30
	CA7-23	23			30
CEP9-ESM-____-55-30, CEP9-ESM-____-55-60	CA7-30	30			50
	CA7-37	37			50
	CA7-43	43			70
	CA7-55	55			80

Table 9 - Short Circuit Ratings per UL60947-4-1 and CSA 22.2 No. EN60947-4-1 with CA7contactors protected by KTB7 frame circuit breakers

Overload Relay using Sensing Module Cat. No.	Contactor Cat. No.	Max. Starter FLC[A]	Max. Available Fault Current [A]	Max. Voltage [V]	Max. Circuit Breaker Cat. No. KTB7-32H-
CEP9-ESM-____-23-30	CA7-9	9	65,000	480Y/277V	32A (30 A)
	CA7-12	12			
	CA7-16	16			
	CA7-23	23			
CEP9-ESM-____-23-30	CA7-9	9	35,000	600Y/347V	32A (30 A)
	CA7-12	12			
	CA7-16	16			
	CA7-23	23			
CEP9-ESM-____-23-30	CA7-9	9	5,000	600Y/347V	32A (30 A)
	CA7-12	12			
	CA7-16	16			
	CA7-23	23			

Fuse Coordination

The following tables list Type I and Type II Fuse Coordination when used in conjunction with CA7 Contactors.

ATTENTION: Select the motor branch circuit protection that complies with the NEC and any other governing regional or local codes.

Table 10 - Type 1 and Type II fuse coordination with CA7 contactors per EN60947-4-1

Overload Relay using Sensing Module Cat. No.	Contactor Cat. No.	Max. Starter FLC[A]	Prospective Short-Circuit Current, I_r [A]	Conditional Short-Circuit Current, I_q [A]	Max. Voltage [V]	Type I Class J or CC Fuse [A]	Type II Class J or CC Fuse [A]
CEP9-ESM-____-23-30	CA7-9	9	1000	100,000	600	20	15
	CA7-12	12				20	20
	CA7-16	16				30	30
	CA7-23	23	3000			40	40
CEP9-ESM-____-55-30, CEP9-ESM-____-55-60	CA7-30	30				50	50
	CA7-37	37				50	50
	CA7-43	43				70	70
	CA7-55	55				80	80

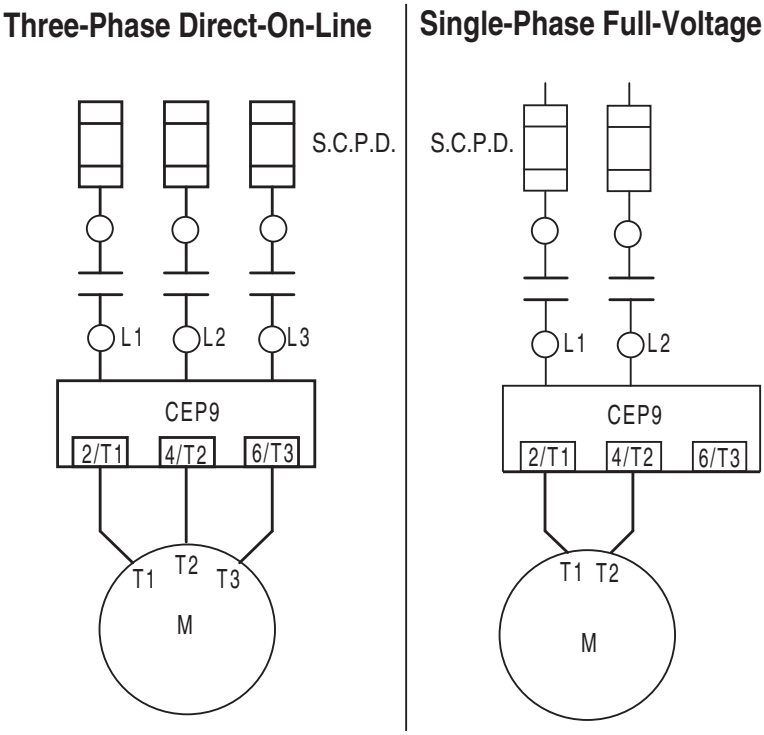
Typical Motor Connections

ATTENTION: When working on energized circuits, DO NOT rely on voltage and current information provided by the CEP9 Electronic Overload Relay for personal safety. Always use a portable voltage or current measurement device to measure the signal locally.

Three-Phase Direct On-Line (DOL) & Single-Phase Full Voltage

The following wiring diagram illustrates the CEP9 Electronic Overload Relay typical motor connections in a three-phase DOL and Single-Phase Full Voltage applications.

Figure 31 - CEP9 DOL and Single-Phase Full Voltage Connections



External Line Current Transformer Application

Current Transformer Ratio

The following CEP9 Electronic Overload Relay sensing module catalog numbers can be used with step down current transformers:

- CEP9-ESM-IG-7T-30
- CEP9-ESM-IG-T-30
- CEP9-ESM-IG-P-30
- CEP9-ESM-I-7T-30
- CEP9-ESM-I-T-30
- CEP9-ESM-I-P-30
- CEP9-ESM-VIG-CT-30

CT Primary (Parameter 263) and CT Secondary (Parameter 264) allows the user to identify the turns ratio of the step down current transformers in use. The CEP9 Electronic Overload Relay will automatically adjust the measured current based on these two configuration parameters. Users will use the primary current for their FLA settings.

Table 11 - CT Primary (Parameter 263)

CT Primary (Parameter 263)	
Default Value	5
Minimum Value	1
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Amps

Table 12 - CT Secondary (Parameter 264)

CT Secondary (Parameter 264)	
Default Value	5
Minimum Value	1
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Amps

ATTENTION: Improper configuration of the CT Ratio parameters can result in the CEP9 Electronic Overload Relay reporting inaccurate motor operational data and possible motor damage.

IMPORTANT The CEP9 Electronic Overload Relay will trip on a configuration fault when the FLA setting is outside of the legal range of the selected CT Ratio settings. The TRIP/WARN LED status indicator will flash red 3-long, 8-short blinking pattern.

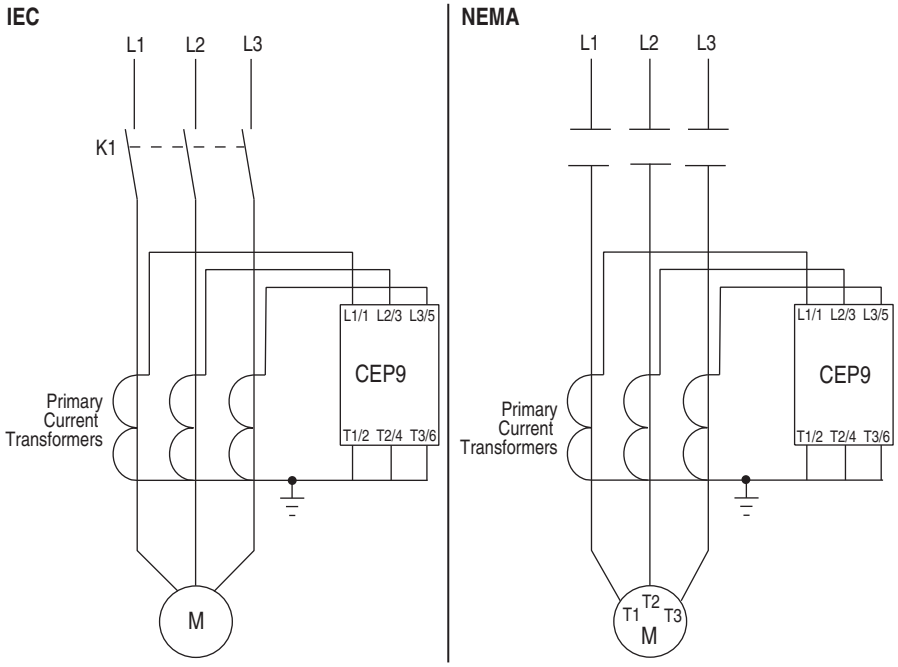
The installer shall (1) provide one CT for each motor phase and shall (2) connect the CT's secondary leads to the appropriate sensing module power terminals. The CTs shall be selected to be capable of providing the required VA to the secondary load, which includes the CEP9 Sensing Module burden of 0.1 VA at the rated secondary current and the wiring burden. Finally, the CT shall (1) be rated for Protective Relaying to accommodate the high inrush currents associated with motor startup and shall (2) have an accuracy of ≤±2% over its normal operating range. Typical CT ratings include:

- ANSI USA

- CSA (Canada)
- IEC (Europe)
- Class C5 BO.1
- Class 10L5
- 5 VA Class SP10

ATTENTION: The improper selection of a current transformer can result in the CEP9 Electronic Overload Relay reporting inaccurate motor operational data and possible motor damage. The selected current transformer must be rated for protective relaying applications.

Figure 32 - External Current Transformer Connection



The CEP9 Electronic Overload Relay voltage based sensing modules support a wide variety of power systems. Listed below are the power systems supported by the specific sensing module.

Table 13 - Supported Power Systems

Catalog Number	Connection Type	Power System
CEP9-ESM-VIG-___-___	Direct	Single Phase Delta Wye Grounded B Phase Delta
CEP9-ESM-VIG-CT-30	Direct	Single Phase Delta Wye Grounded B Phase Delta
	3 PT	Delta Wye
	2 PT	Single Phase Open Delta

Voltage Mode

Voltage Mode (Parameter 252) determines the method for how voltage is monitored CEP9 Electronic Overload Relay. The user selects the connection type for the appropriate power system.

Table 14 - Voltage Mode (Parameter 352)

Default Value	0 = Delta direct or with PTs
Range	0 = Delta direct or with PTs 1 = Wye direct or with PTs 2 = Delta with Delta to Wye PTs 3 = Wye with Delta to Wye PTs 4 = Delta with Wye to Delta PTs 5 = Wye with Wye to Delta PTs
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Potential (Voltage) Transformer Ratio

The CEP9 Electronic Overload Relay sensing module catalog number CEP9-ESM-VIG-CT-30 can be used with step down potential (voltage) transformers. PT Primary (Parameter 353) and PT Secondary (Parameter 354) allows the user to identify the turns ratio of the step down potential (voltage) transformers in use. The CEP9 Electronic Overload Relay will automatically adjust the measured voltage based on these two configuration parameters. Users will use the primary voltage for their voltage protection settings.

Table 15 - PT Primary (Parameter 353)

Default Value	480
Minimum Value	1
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Amps

Table 16 - PT Secondary (Parameter 354)

Default Value	480
Minimum Value	165535
Maximum Value	
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Amps

Control Circuits

ATTENTION: Do not exceed the ratings of the CEP9 Electronic Overload Relay's output and trip relay. If the coil current or voltage of the contactor exceeds the overload relay's ratings, an interposing relay must be used.

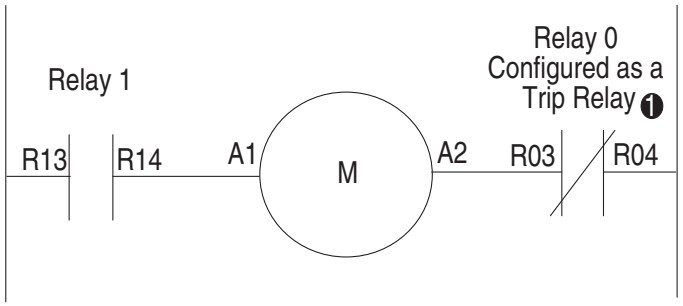
ATTENTION: When the power is applied to the CEP9 Electronic Overload Relay's A1 and A2 terminals, the N.O. relay contact assigned as a Trip Relay will close after approximately 2 seconds if no trip condition exists.

ATTENTION: Additional control circuit protection may be required. Refer to the applicable electrical codes.

The CEP9 Electronic Overload Relay is capable of providing motor control logic for many different type of motor starters (refer to Chapter 4 for more information on Operating Modes). By default, the CEP9 is configured for the Overload-Network operating mode in which Relay 0 (terminals R03 and R04) is configured to be a normally closed Trip Relay. The following wiring diagrams are typical control circuits for Non-Reversing and Reversing Motor starters that use the Overload-Network operating mode.

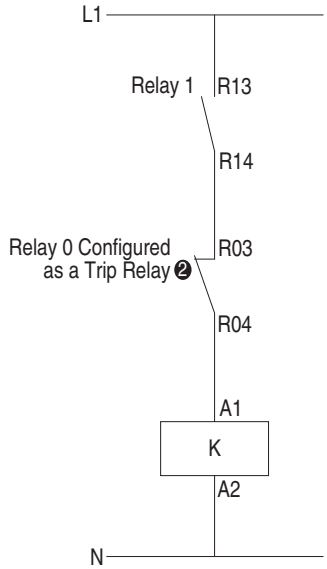
Full-Voltage Non-Reversing Starter (with Network Control)

Figure 33 - NEMA Nomenclature



❶ Contact shown with supply voltage applied.

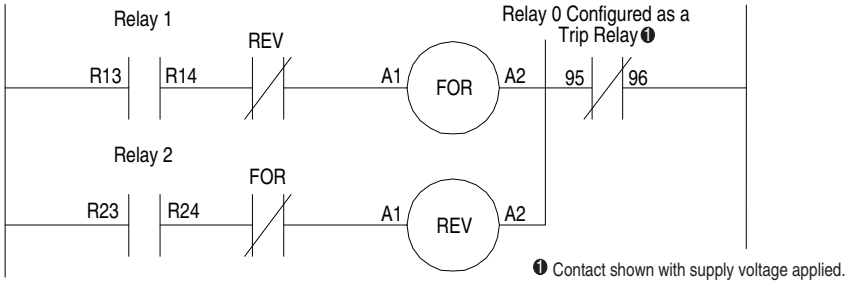
Figure 34 - CENELEC Nomenclature



❷ Contact shown with supply voltage applied.

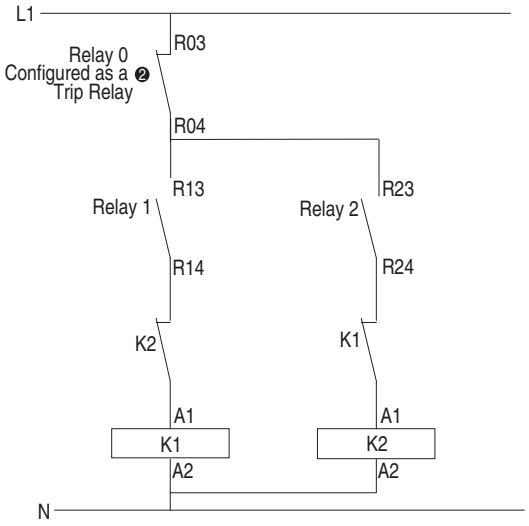
Full-Voltage Reversing Starter (with Network Control)

Figure 35 - NEMA Nomenclature



❶ Contact shown with supply voltage applied.

Figure 36 - CENELEC Nomenclature



❷ Contact shown with supply voltage applied.

System Operation and Configuration

Introduction

This chapter provides instructions for operating and configuring an CEP9 Electronic Overload Relay system. Settings for Device Modes, Option Match, Security Policy, I/O Assignments, Expansion Bus Fault, Emergency Start, and an introduction to Operating Modes are included in this chapter.

Device Modes

The CEP9 Electronic Overload Relay has five device modes to validate configuration of the device and limit when a user can configure the CEP9 Electronic Overload Relay, perform a firmware update, and issue commands.

- Administration Mode
- Operation Mode
- Run Mode
- Test Mode
- Invalid Configuration Mode

Administration Mode

Administration Mode is a maintenance mode for the CEP9 Electronic Overload Relay which allows users to configure parameters, modify security policies, enable web servers (see page 288 to enable the EtherNet/IP web server), perform firmware upgrades, and issue commands.

Follow these steps to enter into Administration Mode:

1. Set the rotary dials on the CEP9 Communication Module to the following values
   - For EtherNet/IP set the rotary dials to 0-0-0
   - For DeviceNet set the rotary dials to 7-7
2. Cycle power on the CEP9 Electronic Overload Relay

After commissioning activities and maintenance tasks are completed, return the CEP9 Electronic Overload Relay back to Operation or Run Mode by setting the rotary dials of the CEP9 communication module back to its previous positions and cycle power.

Operation Mode

Operation Mode is a standby mode for the CEP9 Electronic Overload Relay in which the CEP9 is ready to protect an electric motor and no electrical current has been detected. Users can modify configuration parameters, upgrade firmware, and issue commands if the appropriate security policies are enabled. The Power LED on the Communication Module and Operator Stations will be flashing green and bit 14 in Device Status 0 (Parameter 20) is set to 1 when the device is in Operation Mode.

Table 17 - Operation Mode Bit Function Detail — Device Status 0 (Parameter 20)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Trip Present
														X		Warning Present
													X			Invalid Configuration
												X				Current Present
											X					GFCurrent Present
										X						Voltage Present
									X							Emergency Start Enabled
								X								DeviceLogix Enabled
							X									Feedback Timeout Enabled
						X										Operator Station Present
					X											Voltage Sensing Present
				X												Intern Ground Fault Sensing Present
			X													Extern Ground Fault Sensing Present
		X														PTC Sensing
	X															Ready
																Reserved

Run Mode

Run Mode is an active mode for the CEP9 Electronic Overload Relay in which the CEP9 is sensing electrical current and is actively protecting an electric motor. Only non-motor protection configuration parameters can be modified if the appropriate security policies are enabled. The Power LED on the Communication Module and Operator Stations will be solid green and bits 3, 4, and/or 5 in Device Status 0 (Parameter 20) are set to 1 when the device is in Run Mode.

Table 18 - Run Mode Bit Function Detail — Device Status 0 (Parameter 20)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Trip Present
														X		Warning Present
													X			Invalid Configuration
												X				Current Present
											X					GFCurrent Present
										X						Voltage Present
									X							Emergency Start Enabled
								X								DeviceLogix Enabled
							X									Feedback Timeout Enabled
						X										Operator Station Present
					X											Voltage Sensing Present
				X												Intern Ground Fault Sensing Present
			X													Extern Ground Fault Sensing Present
		X														PTC Sensing
	X															Ready
																Reserved

Test Mode

Test Mode is used by installers of motor control centers who are testing and commissioning motor starters with an automation system. A digital input of the CEP9 Electronic Overload Relay is assigned to monitor the motor control center enclosure's Test Position. The Input Assignments (Parameters 196-201) are described later in this chapter.

Users commissioning motor starters in an automation system can put their motor control center enclosure into the Test Position to activate Test Mode and verify that the digital inputs and relay outputs of the CEP9 Electronic Overload Relay are operating properly with the motor starter without energizing power to the motor. If the CEP9 Electronic Overload Relay senses current or voltage in Test Mode, the CEP9 Electronic Overload Relay will generate a Test Mode Trip.

Invalid Configuration Mode

Invalid Configuration Mode is an active mode for the CEP9 Electronic Overload Relay in which the CEP9 is in a tripped state due to invalid configuration data. Invalid Configuration Parameter (Parameter 38) indicates the parameter number that is causing the fault. Invalid Configuration Cause (Parameter 39) identifies the reason for Invalid Configuration Mode.

Table 19 - Invalid Configuration Cause (Parameter 39)

Code	Description
0	No Error
1	Value over maximum value
2	Value under minimum value
3	Illegal value
4	L3 Current detected (for single-phase applications)
5	CopyCat error

The Trip/Warn LED on the Communication Module and Operator Stations will be flashing a pattern of red, 3 long and 8 short blinks, and bits 0 and 2 in Device Status 0 (Parameter 20) are set to 1 when the device is in Invalid Configuration Mode.

Table 20 - Invalid Configuration Mode Bit Function Detail — Device Status 0 (Parameter 20)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Trip Present
														X		Warning Present
													X			Invalid Configuration
												X				Current Present
											X					GFCurrent Present
										X						Voltage Present
									X							Emergency Start Enabled
								X								DeviceLogix Enabled
							X									Feedback Timeout Enabled
						X										Operator Station Present
					X											Voltage Sensing Present
				X												Intern Ground Fault Sensing Present
			X													Extern Ground Fault Sensing Present
		X														PTC Sensing
	X															Ready
																Reserved

To return to Operation/Run Mode, place a valid configuration value in the parameter identified by Invalid Configuration Parameter (Parameter 38) and Invalid Configuration Cause (Parameter 39). Reset the trip state of the CEP9 Electronic Overload Relay by pressing the blue reset button on the Communication Module, via network communications, with the internal web server of the EtherNet/IP communications module, or by an assigned digital input.

Option Match

Due to the modular nature of the CEP9 Electronic Overload Relay, a user can enable the Option Match feature to ensure that the options that were expected for the motor protection application are the ones that are present on the CEP9

Electronic Overload Relay system. Users can configure an option mismatch to cause a protection trip or provide a warning within the CEP9.

Enable Option Match Protection Trip (Parameter 186)

To enable the CEP9 Electronic Overload Relay's Option Match feature to cause a protection trip in the event of an option mismatch, place a (1) in bit position 8 of Parameter 186 (Control Trip Enable). Users can select the specific option match features to cause a protection trip in Parameter 233 (Option Match Action).

Table 21 - Enable Option Match Protection Trip Bit Function Detail— Control Trip Enable (Parameter 186)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Test Trip Enable
														X		PTC Trip Enable
													X			DeviceLogix Trip Enable
												X				Operator Station Trip Enable
											X					Remote Trip Enable
										X						Blocked Start Trip Enable
									X							Hardware Fault Trip Enable
								X								Configuration Trip Enable
							X									Option Match Trip Enable
						X										Feedback Timeout Trip Enable
					X											Expansion Bus Trip Enable
																Reserved
																Reserved
		X														Non-Volatile Memory Trip Enable
	X															Ready
																Reserved

Enable Option Match Protection Warning (Parameter 192)

To enable the CEP9 Electronic Overload Relay's Option Match feature to cause a warning in the event of an option mismatch, place a (1) in bit position 8 of Parameter 192 (Control Warning Enable). Users can select the specific option match features to cause a warning in Parameter 233 (Option Match Action).

Table 22 - Enable Option Match Protection Warning Bit Function Detail— Control Warning Enable (Parameter 192)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
																Reserved
																Reserved
													X			DeviceLogix Warning Enable
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
							X									Option Match Warning Enable
						X										Feedback Timeout Warning Enable
					X											Expansion Bus Warning Enable
				X												Number Of Starts Warning Enable
			X													Operating Hours Warning Enable
																Reserved

Control Module Type (Parameter 221)

The CEP9 Electronic Overload Relay offers six different control modules. Place the value of the expected control module into Parameter 221. A value of (0) disables the Option Match feature for the control module.

Table 23 - Control Module Type (Parameter 221)

Code	Description	Control Module Cat. No.
0	Ignore	—
1	6 Inputs, 24V DC / 3 Relay Outputs	CEP9-EIO-63-24D
2	4 Inputs, 110-120V AC 50/60Hz / 3 Relay Outputs	CEP9-EIO-43-120
3	4 Inputs, 220-240V AC 50/60Hz / 3 Relay Outputs	CEP9-EIO-43-240
4	4 Inputs, 24V DC / 2 Relay Outputs / External Ground Fault / PTC	CEP9-EIOGP-42-24D
5	2 Inputs, 110-120V AC 50/60Hz / 2 Relay Outputs / External Ground Fault / PTC	CEP9-EIOGP-22-120
6	2 Inputs, 220-240V AC 50/60Hz / 2 Relay Outputs / External Ground Fault / PTC	CEP9-EIOGP-22-240

Sensing Module Type (Parameter 222)

The CEP9 Electronic Overload Relay offers 12 different sensing modules. Place the value of the expected sensing module into Parameter 222. A value of (0) disables the Option Match feature for the sensing module.

Table 24 - Sensing Module Type (Parameter 222)

Code	Description	Sensing Module Cat. No.
0	Ignore	—
1	Voltage / Current 0.5…30 A / Ground Fault	CEP9-ESM-VIG-30A-___
2	Voltage / Current 6…60 A / Ground Fault	CEP9-ESM-VIG-60A-___
3	Voltage / Current 10…100 A / Ground Fault	CEP9-ESM-VIG-100A-___
4	Voltage / Current 20…200 A / Ground Fault	CEP9-ESM-VIG-200A-___
5	Current 0.5…30 A / Ground Fault	CEP9-ESM-IG-30A-___
6	Current 6…60 A / Ground Fault	CEP9-ESM-IG-60A-___
7	Current 10…100 A / Ground Fault	CEP9-ESM-IG-100A-___
8	Current 20…200 A / Ground Fault	CEP9-ESM-IG-200A-___
9	Current 0.5…30 A	CEP9-ESM-I-30A-___
10	Current 6…60 A	CEP9-ESM-I-60A-___
11	Current 10…100 A	CEP9-ESM-I-100A-___
12	Current 20…200 A	CEP9-ESM-I-200A-___

Communication Module Type (Parameter 223)

The CEP9 Electronic Overload Relay offers two different communication modules. Place the value of the expected communication module into Parameter 223. A value of (0) disables the Option Match feature for the communication module.

Table 25 - Communication Module Type (Parameter 223)

Code	Description	Communication Module Cat. No.
0	Ignore	—
1	EtherNet/IP with Dual Port Switch supporting DLR	CEP9-ECM-ETR
2	DeviceNet	CEP9-ECM-DNT

Operator Station Type (Parameter 224)

The CEP9 Electronic Overload Relay offers two different types of operator stations. Place the value of the expected operator station into Parameter 224. A value of (0) disables the Option Match feature for the operator station. A value of (1), *"No Operator Station"*, makes the operator station not available to the Expansion Bus and prevents a user from connecting an operator station to the CEP9 Electronic Overload Relay system.

Table 26 - Operator Station Type (Parameter 224)

Code	Description	Operator Station Cat. No.
0	Ignore	—
1	No Operator Station (Operator Station Not Available)	—
2	Control Station	CEP9-EOS-SCS
3	Diagnostic Station with LCD	CEP9-EOS-SDS

Digital I/O Expansion Module 1 Type (Parameter 225)

The CEP9 Electronic Overload Relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the Digital I/O expansion module set to Digital Module 1. There are three different types of Digital I/O expansion modules. Place the value of the expected Digital I/O expansion module set to Digital Module 1 into Parameter 225. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1), *"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 1 not available to the Expansion Bus and prevents a user from connecting a Digital I/O expansion module set to Digital Module 1 to the CEP9 Electronic Overload Relay system.

Table 27 - Digital I/O Expansion Module 1 Type (Parameter 225)

Code	Description	Digital I/O Expansion Module Cat. No.
0	Ignore	—
1	No Digital I/O Expansion Module (Digital I/O Expansion Module Not Available)	—
2	4 Inputs, 24V DC / 2 Relay Outputs	CEP9-EXP-DIO-42-24D
3	4 Inputs, 110-120V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-120
4	4 Inputs, 220-240V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-240

Digital I/O Expansion Module 2 Type (Parameter 226)

The CEP9 Electronic Overload Relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the Digital I/O expansion module set to Digital Module 2. There are three different types of Digital I/O expansion modules. Place the value of the expected Digital I/O expansion module set to Digital Module 2 into Parameter 226. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1),*"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 2 not available to the Expansion Bus and prevents a user from connecting a Digital I/O expansion module set to Digital Module 2 to the CEP9 Electronic Overload Relay system.

Table 28 - Digital I/O Expansion Module 2 Type (Parameter 226)

Code	Description	Digital I/O Expansion Module Cat. No.
0	Ignore	—
1	No Digital I/O Expansion Module (Digital I/O Expansion Module Not Available)	—
2	4 Inputs, 24V DC / 2 Relay Outputs	CEP9-EXP-DIO-42-24D
3	4 Inputs, 110-120V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-120
4	4 Inputs, 220-240V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-240

Digital I/O Expansion Module 3 Type (Parameter 227)

The CEP9 Electronic Overload Relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the Digital I/O expansion module set to Digital Module 3. There are three different types of Digital I/O expansion modules. Place the value of the expected Digital I/O expansion module set to Digital Module 3 into Parameter 227. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1),*"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 3 not available to the Expansion Bus and prevents a user from connecting a Digital I/O expansion module set to Digital Module 3 to the CEP9 Electronic Overload Relay system.

Table 29 - Digital I/O Expansion Module 3 Type (Parameter 227)

Code	Description	Digital I/O Expansion Module Cat. No.
0	Ignore	—
1	No Digital I/O Expansion Module (Digital I/O Expansion Module Not Available)	—
2	4 Inputs, 24V DC / 2 Relay Outputs	CEP9-EXP-DIO-42-24D
3	4 Inputs, 110-120V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-120
4	4 Inputs, 220-240V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-240

Digital I/O Expansion Module 4 Type (Parameter 228)

The CEP9 Electronic Overload Relay supports up to four additional Digital I/O expansion modules. This parameter configures the Option Match feature for the

Digital I/O expansion module set to Digital Module 4. There are three different types of Digital I/O expansion modules. Place the value of the expected Digital I/O expansion module set to Digital Module 4 into Parameter 228. A value of (0) disables the Option Match feature for this Digital I/O expansion module. A value of (1), *"No Digital I/O Expansion Module"*, makes the Digital I/O expansion module set to Digital Module 4 not available to the Expansion Bus and prevents a user from connecting a Digital I/O expansion module set to Digital Module 4 to the CEP9 Electronic Overload Relay system.

Table 30 - Digital I/O Expansion Module 4 Type (Parameter 228)

Code	Description	Digital I/O Expansion Module Cat. No.
0	Ignore	—
1	No Digital I/O Expansion Module (Digital I/O Expansion Module Not Available)	—
2	4 Inputs, 24V DC / 2 Relay Outputs	CEP9-EXP-DIO-42-24D
3	4 Inputs, 110-120V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-120
4	4 Inputs, 220-240V AC 50/60Hz / 2 Relay Outputs	CEP9-EXP-DIO-42-240

Analog I/O Expansion Module 1 Type (Parameter 229)

The CEP9 Electronic Overload Relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 1. There are three different types of Analog I/O expansion modules. Place the value of the expected Analog I/O expansion module set to Analog Module 1 into Parameter 229. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module"*, makes the Analog I/O expansion module set to Analog Module 1 not available to the Expansion Bus and prevents a user from connecting an Analog I/O expansion module set to Analog Module 1 to the CEP9 Electronic Overload Relay system.

Table 31 - Analog I/O Expansion Module 1 Type (Parameter 229)

Code	Description	Analog I/O Expansion Module Cat. No.
0	Ignore	—
1	No Analog I/O Expansion Module (Analog I/O Expansion Module Not Available)	—
2	3 Universal Analog Inputs / 1 Analog Output	CEP9-EXP-AIO-31

Analog I/O Expansion Module 2 Type (Parameter 230)

The CEP9 Electronic Overload Relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 2. There are three different types of Analog I/O expansion modules. Place the value of the expected Analog I/O expansion module set to Analog Module 2 into Parameter 230. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module "*, makes the Analog I/O expansion module set to Analog Module 2 not available to the Expansion Bus and prevents a user from connecting an Analog I/O expansion module set to Analog Module 2 to the CEP9 Electronic Overload Relay system.

Table 32 - Analog I/O Expansion Module 2 Type (Parameter 230)

Code	Description	Analog I/O Expansion Module Cat. No.
0	Ignore	—
1	No Analog I/O Expansion Module (Analog I/O Expansion Module Not Available)	—
2	3 Universal Analog Inputs / 1 Analog Output	CEP9-EXP-AIO-31

Analog I/O Expansion Module 3 Type (Parameter 231)

The CEP9 Electronic Overload Relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 3. There are three different types of Analog I/O expansion modules. Place the value of the expected Analog I/O expansion module set to Analog Module 3 into Parameter 231. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module "*, makes the Analog I/O expansion module set to Analog Module 3 not available to the Expansion Bus and prevents a user from connecting an Analog I/O expansion module set to Analog Module 3 to the CEP9 Electronic Overload Relay system.

Table 33 - Analog I/O Expansion Module 3 Type (Parameter 231)

Code	Description	Analog I/O Expansion Module Cat. No.
0	Ignore	—
1	No Analog I/O Expansion Module (Analog I/O Expansion Module Not Available)	—
2	3 Universal Analog Inputs / 1 Analog Output	CEP9-EXP-AIO-31

Analog I/O Expansion Module 4 Type (Parameter 232)

The CEP9 Electronic Overload Relay supports up to four additional Analog I/O expansion modules. This parameter configures the Option Match feature for the Analog I/O expansion module set to Analog Module 4. There are three different types of Analog I/O expansion modules. Place the value of the expected Analog I/O expansion module set to Analog Module 4 into Parameter 232. A value of (0) disables the Option Match feature for this Analog I/O expansion module. A value of (1), *"No Analog I/O Expansion Module"*, makes the Analog I/O expansion module set to Analog Module 4 not available to the Expansion Bus and prevents a user from connecting an Analog I/O expansion module set to Analog Module 4 to the CEP9 Electronic Overload Relay system.

Table 34 - Analog I/O Expansion Module 4 Type (Parameter 232)

Code	Description	Analog I/O Expansion Module Cat. No.
0	Ignore	—
1	No Analog I/O Expansion Module (Analog I/O Expansion Module Not Available)	—
2	3 Universal Analog Inputs / 1 Analog Output	CEP9-EXP-AIO-31

Option Match Action (Parameter 233)

The Option Match feature for the CEP9 Electronic Overload Relay allows the user to specify an action when there is an option mismatch – Protection Trip or Warning. Place a (0) in the appropriate bit position for a warning, and place a (1) in the appropriate bit position to cause a protection trip if there is an option mismatch.

Table 35 - Option Match Action (Parameter 233) Bit Function Detail

Bit																Function
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
															X	Control Module Mismatch Action
														X		Sensing Module Mismatch Action
													X			Communication Module Mismatch Action
												X				Operator Station Mismatch Action
											X					Digital Module 1 Mismatch Action
										X						Digital Module 2 Mismatch Action
									X							Digital Module 3 Mismatch Action
								X								Digital Module 4 Mismatch Action
							X									Analog Module 1 Mismatch Action
						X										Analog Module 2 Mismatch Action
					X											Analog Module 3 Mismatch Action
				X												Analog Module 4 Mismatch Action

Security Policy

The CEP9 Electronic Overload Relay has a security policy that can be used to prevent users with malicious intent to potentially damage a motor or piece of equipment. By default, the user can only modify the security policy when the CEP9 Electronic Overload Relay is in Administration Mode (see page 53 to learn how to enable Administration Mode).

Table 36 - Security Policy (Parameter 211) Bit Function Detail

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Device Configuration Enable
														X		Device Reset Enable
													X			Firmware Update Enable
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
X																Security Policy Config Enable

Device Configuration Policy

The Device Configuration Policy allows users to send external message instructions via a communications network to write values to configuration parameters. When this policy is disabled, all external message instructions with configuration data will return a communications error when the CEP9 Electronic Overload Relay is in Operation Mode or Run Mode.

Device Reset Policy

The Device Reset Policy allows users to send external message instruction via a communications network to perform a soft device reset when the CEP9 Electronic Overload Relay is in Operation Mode. When this policy is disabled, all external reset message instructions will return a communications error when the CEP9 Electronic Overload Relay is in Operation Mode or Run Mode.

Firmware Update Policy

The Firmware Update Policy allows users to update the internal firmware of the communication module and control module via ControlFlash when the CEP9 Electronic Overload Relay is in Operation Mode. When this policy is disabled, firmware updates will return a communications error when the CEP9 Electronic Overload Relay is in Operation Mode or Run Mode.

Security Configuration Policy

The Security Configuration Policy allows users to modify the Security Policy of the CEP9 Electronic Overload Relay in Operation Mode. When this policy is disabled, the Security Policy can only be modified when the CEP9 Electronic Overload Relay is in Administration Mode.

I/O Assignments

The CEP9 Electronic Overload Relay has native digital inputs and relay outputs in the Control Module. This I/O can be assign to dedicated functions. Listed below are the function assignments for the available Control Module I/O.

Input Pt00 Assignment (Parameter 196)

Input Pt00 Assignment (Parameter 196) allows the user to assign this digital input for the following functions:

Table 37 - Input Pt00 Assignment (Parameter 196)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the CEP9 when it is in a tripped state
2	Remote Trip	Force a the CEP9 to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current based protection algorithms
4	Force Snapshot	Force the CEP9 to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command
6	Test Mode	Enable Test Mode monitoring
7	L1 Line Loss Arm	Activate L1 Line Loss Protection
8	L2 Line Loss Arm	Activate L2 Line Loss Protection
9	L3 Line Loss Arm	Activate L3 Line Loss Protection
10	L1 L2 Line Loss Arm	Activate L1 and L2 Line Loss Protection
11	L2 L3 Line Loss Arm	Activate L2 and L3 Line Loss Protection
12	L1 L3 Line Loss Arm	Activate L1 and L3 Line Loss Protection
13	L1 L2 L3 Line Loss Arm	Activate L1, L2, and L3 Line Loss Protection

Input Pt01 Assignment (Parameter 197)

Input Pt01 Assignment (Parameter 197) allows the user to assign this digital input for the following functions:

Table 38 - Input Pt01 Assignment (Parameter 197)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the CEP9 when it is in a tripped state
2	Remote Trip	Force a the CEP9 to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current based protection algorithms
4	Force Snapshot	Force the CEP9 to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command
6	Test Mode	Enable Test Mode monitoring
7	L1 Line Loss Arm	Activate L1 Line Loss Protection
8	L2 Line Loss Arm	Activate L2 Line Loss Protection
9	L3 Line Loss Arm	Activate L3 Line Loss Protection
10	L1 L2 Line Loss Arm	Activate L1 and L2 Line Loss Protection
11	L2 L3 Line Loss Arm	Activate L2 and L3 Line Loss Protection
12	L1 L3 Line Loss Arm	Activate L1 and L3 Line Loss Protection
13	L1 L2 L3 Line Loss Arm	Activate L1, L2, and L3 Line Loss Protection

Input Pt02 Assignment (Parameter 198)

Input Pt02 Assignment (Parameter 198) allows the user to assign this digital input for the following functions:

Table 39 - Input Pt02 Assignment (Parameter 198)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the CEP9 when it is in a tripped state
2	Remote Trip	Force a the CEP9 to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current based protection algorithms
4	Force Snapshot	Force the CEP9 to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command
6	Test Mode	Enable Test Mode monitoring
7	L1 Line Loss Arm	Activate L1 Line Loss Protection
8	L2 Line Loss Arm	Activate L2 Line Loss Protection
9	L3 Line Loss Arm	Activate L3 Line Loss Protection
10	L1 L2 Line Loss Arm	Activate L1 and L2 Line Loss Protection
11	L2 L3 Line Loss Arm	Activate L2 and L3 Line Loss Protection
12	L1 L3 Line Loss Arm	Activate L1 and L3 Line Loss Protection
13	L1 L2 L3 Line Loss Arm	Activate L1, L2, and L3 Line Loss Protection

Input Pt03 Assignment (Parameter 199)

Input Pt03 Assignment (Parameter 199) allows the user to assign this digital input for the following functions:

Table 40 - Input Pt03 Assignment (Parameter 199)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the CEP9 when it is in a tripped state
2	Remote Trip	Force a the CEP9 to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current based protection algorithms
4	Force Snapshot	Force the CEP9 to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command
6	Test Mode	Enable Test Mode monitoring
7	L1 Line Loss Arm	Activate L1 Line Loss Protection
8	L2 Line Loss Arm	Activate L2 Line Loss Protection
9	L3 Line Loss Arm	Activate L3 Line Loss Protection
10	L1 L2 Line Loss Arm	Activate L1 and L2 Line Loss Protection
11	L2 L3 Line Loss Arm	Activate L2 and L3 Line Loss Protection
12	L1 L3 Line Loss Arm	Activate L1 and L3 Line Loss Protection
13	L1 L2 L3 Line Loss Arm	Activate L1, L2, and L3 Line Loss Protection

Input Pt04 Assignment (Parameter 200)

Input Pt04 Assignment (Parameter 200) allows the user to assign this digital input for the following functions:

Table 41 - Input Pt04 Assignment (Parameter 200)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the CEP9 when it is in a tripped state
2	Remote Trip	Force a the CEP9 to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current based protection algorithms
4	Force Snapshot	Force the CEP9 to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command
6	Test Mode	Enable Test Mode monitoring
7	L1 Line Loss Arm	Activate L1 Line Loss Protection
8	L2 Line Loss Arm	Activate L2 Line Loss Protection
9	L3 Line Loss Arm	Activate L3 Line Loss Protection
10	L1 L2 Line Loss Arm	Activate L1 and L2 Line Loss Protection
11	L2 L3 Line Loss Arm	Activate L2 and L3 Line Loss Protection
12	L1 L3 Line Loss Arm	Activate L1 and L3 Line Loss Protection
13	L1 L2 L3 Line Loss Arm	Activate L1, L2, and L3 Line Loss Protection

Input Pt05 Assignment (Parameter 201)

Input Pt05 Assignment (Parameter 201) allows the user to assign this digital input for the following functions:

Table 42 - Input Pt05 Assignment (Parameter 201)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the CEP9 when it is in a tripped state
2	Remote Trip	Force a the CEP9 to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current based protection algorithms
4	Force Snapshot	Force the CEP9 to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command
6	Test Mode	Enable Test Mode monitoring
7	L1 Line Loss Arm	Activate L1 Line Loss Protection
8	L2 Line Loss Arm	Activate L2 Line Loss Protection
9	L3 Line Loss Arm	Activate L3 Line Loss Protection
10	L1 L2 Line Loss Arm	Activate L1 and L2 Line Loss Protection
11	L2 L3 Line Loss Arm	Activate L2 and L3 Line Loss Protection
12	L1 L3 Line Loss Arm	Activate L1 and L3 Line Loss Protection
13	L1 L2 L3 Line Loss Arm	Activate L1, L2, and L3 Line Loss Protection

Output Pt00 Assignment (Parameter 202)

Output Pt00 Assignment (Parameter 202) allows the user to assign this relay output for the following functions:

Table 43 - Output Pt00 Assignment (Parameter 202)

Value	Assignment	Description
0	Normal	Function as a relay output
1	Trip Relay	Function as a normally closed contact until the CEP9 is in a tripped state in which the relay opens. The Trip Relay remains open until a trip reset is issued.
2	Control Relay	Function as a combination Normal and Trip Relay. The Control Relay is in a normally open state until the relay is commanded to close by communications or via a DeviceLogix program. When the CEP9 enters into a tripped state the Control Relay opens and remains open until a trip reset is issued.
3	Trip Alarm	Function as a normally open contact until the CEP9 is in a tripped state in which the relay closes. The Trip Alarm remains closed until a trip reset is issued.
4	Warning Alarm	Function as a normally open contact until the CEP9 is in a protection warning state in which the relay closes. The Warning Alarm remains closed until the protection warning clears.

Output Pt01 Assignment (Parameter 203)

Output Pt01 Assignment (Parameter 203) allows the user to assign this relay output for the following functions:

Table 44 - Output Pt01 Assignment (Parameter 203)

Value	Assignment	Description
0	Normal	Function as a relay output
1	Trip Relay	Function as a normally closed contact until the CEP9 is in a tripped state in which the relay opens. The Trip Relay remains open until a trip reset is issued.
2	Control Relay	Function as a combination Normal and Trip Relay. The Control Relay is in a normally open state until the relay is commanded to close by communications or via a DeviceLogix program. When the CEP9 enters into a tripped state the Control Relay opens and remains open until a trip reset is issued.
3	Trip Alarm	Function as a normally open contact until the CEP9 is in a tripped state in which the relay closes. The Trip Alarm remains closed until a trip reset is issued.
4	Warning Alarm	Function as a normally open contact until the CEP9 is in a protection warning state in which the relay closes. The Warning Alarm remains closed until the protection warning clears.

Output Pt02 Assignment (Parameter 204)

Output Pt02 Assignment (Parameter 204) allows the user to assign this relay output for the following functions:

Table 45 - Output Pt02 Assignment (Parameter 204)

Value	Assignment	Description
0	Normal	Function as a relay output
1	Trip Relay	Function as a normally closed contact until the CEP9 is in a tripped state in which the relay opens. The Trip Relay remains open until a trip reset is issued.
2	Control Relay	Function as a combination Normal and Trip Relay. The Control Relay is in a normally open state until the relay is commanded to close by communications or via a DeviceLogix program. When the CEP9 enters into a tripped state the Control Relay opens and remains open until a trip reset is issued.
3	Trip Alarm	Function as a normally open contact until the CEP9 is in a tripped state in which the relay closes. The Trip Alarm remains closed until a trip reset is issued.
4	Warning Alarm	Function as a normally open contact until the CEP9 is in a protection warning state in which the relay closes. The Warning Alarm remains closed until the protection warning clears.

Activate FLA2 with Output Relay (Parameter 209)

Activate FLA2 with Output Relay (Parameter 209) allows a user to activate the value in FLA2 Setting (Parameter 177) for the current based protection algorithms when the assigned output relay is in an energized state.

Table 46 - Activate FLA2 with Output Relay (Parameter 209)

Value	Description
0	Disable
1	Pt00 Output
2	Pt01 Output
3	Pt02 Output

Expansion Bus Fault

The CEP9 Electronic Overload Relay's expansion bus can be used to expand the I/O capabilities of the CEP9 Electronic Overload Relay with the addition of digital and analog expansion I/O modules. The Expansion Bus Fault allows a user to have the CEP9 Electronic Overload Relay go into a Trip or Warning state when established Expansion Bus communications is disrupted between the Control Module and any digital and analog expansion I/O modules.

The Expansion Bus Fault is used when the Option Match feature is not enabled for the digital and/or analog expansion I/O modules. The Expansion Bus Fault only monitors for communication disruptions between the Control Module and digital and/or analog expansion I/O modules. Expansion bus communication disruptions between the Control Module and Operator Station do not affect the Expansion Bus fault.

Expansion Bus Trip

Expansion Bus Trip is enabled by setting Control Trip Enable (Parameter 186) bit 10 to 1. When communications is disrupted between the Control Module and digital and/or analog expansion I/O modules, the CEP9 Electronic Overload Relay will go into a tripped state in which the Trip/Warn LED on the Communication Module and Operator station will blink a red 3 long and 11 short blinking pattern.

Table 47 - Expansion Bus Trip Bit Function Detail— Control Trip Enable (Parameter 186)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Test Trip Enable
														X		PTC Trip Enable
													X			DeviceLogix Trip Enable
												X				Operator Station Trip Enable
											X					Remote Trip Enable
										X						Blocked Start Trip Enable
									X							Hardware Fault Trip Enable
								X								Configuration Trip Enable
							X									Option Match Trip Enable
						X										Feedback Timeout Trip Enable
					X											Expansion Bus Trip Enable
																Reserved
																Reserved
		X														Non-Volatile Memory Trip Enable
	X															Ready
																Reserved

To return to Operation/Run Mode, verify that the expansion bus cables are properly plugged into the Bus In and Bus Out ports of all of the expansion modules. When all of the expansion I/O modules' status LEDs are solid green, reset the trip state of the CEP9 Electronic Overload Relay by pressing the blue reset button on the Communication Module, via network communications, with the internal web server of the EtherNet/IP communications module, or by an assigned digital input.

Expansion Bus Warning

Expansion Bus Warning is enabled by setting Control Warning Enable (Parameter 192) bit 10 to 1. When communications is disrupted between the Control Module and digital and/or analog expansion I/O modules, the CEP9 Electronic Overload Relay will go into a warning state in which the Trip/Warn LED on the Communication Module and Operator station will blink a yellow 3 long and 11 short blinking pattern.

Table 48 - Expansion Bus Warning Bit Function Detail— Control Warning Enable (Parameter 192)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
																Reserved
														X		PTC Warning Enable
													X			DeviceLogix Warning Enable
												X				Operator Station Warning Enable
																Reserved
																Reserved
																Reserved
																Reserved
							X									Option Match Warning Enable
						X										Feedback Timeout Warning Enable
					X											Expansion Bus Warning Enable
				X												Number Of Starts Warning Enable
			X													Operating Hours Warning Enable
																Reserved

To return to Operation/Run Mode, verify that the expansion bus cables are properly plugged into the Bus In and Bus Out ports of all of the expansion modules. When all of the expansion I/O modules' status LEDs are solid green, the warning state of the CEP9 Electronic Overload Relay will automatically clear.

Emergency Start

In an emergency, it may be necessary to start a motor even if a protection fault or a communication fault exists. The trip condition may be the result of a thermal overload condition or the number of starts exceeded its configuration. These conditions can be overridden using the Emergency Start feature of the CEP9 Electronic Overload Relay.

To enable the Emergency Start feature in the CEP9 Electronic Overload Relay set the Emergency Start Enable (Parameter 216) to Enable.

Table 49 - Emergency Start (Parameter 216)

Value	Description
0	Disable
1	Enable

Configure one of the Ptxx Input Assignments (Parameters 196...201) to Emergency Start and activate the corresponding digital input.

Table 50 - Emergency Start (Parameter 216) Input PTXX Assignment (Parameters 196…201)

Value	Assignment	Description
0	Normal	Function as a digital input
1	Trip Reset	Reset the CEP9 when it is in a tripped state
2	Remote Trip	Force a the CEP9 to go into a tripped state
3	Activate FLA2	Use the value in FLA2 Setting (Parameter 177) for the current based protection algorithms
4	Force Snapshot	Force the CEP9 to update its Snapshot log
5	Emergency Start	Issue an Emergency Start command

The user can also use a network command to activate the Emergency Start feature. For the EtherNet/IP communications module, the user would set the Emergency Start bit to 1 in Output Assembly 144. See EtherNet/IP Communications on page 281 for more information on EtherNet/IP communications.

When the Emergency Start feature is active, the following actions occur in the CEP9 Electronic Overload Relay:

- Protection trips are ignored
- Output relays configured as Trip Relays are put into closed state
- Normal operation resumes with any Normal or Control Relay assigned output relay
- The Emergency Start Active bit is set to 1 in Device Status 0 (Parameter 20) bit 6

Table 51 - Emergency Start (Parameter 216) Bit Function Detail— Device Status 0 (Parameter 20)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Trip Present
														X		Warning Present
													X			Invalid Configuration
												X				Current Present
											X					GFCurrent Present
										X						Voltage Present
									X							Emergency Start Enabled
								X								DeviceLogix Enabled
							X									Feedback Timeout Enabled
						X										Operator Station Present
					X											Voltage Sensing Present
				X												Intern Ground Fault Sensing Present
			X													Extern Ground Fault Sensing Present
		X														PTC Sensing
	X															Ready
																Reserved

Introduction to Operating Modes

The CEP9 Electronic Overload Relay supports a number of Operating Modes, which consist of configuration rules and logic to control typical full voltage motor starters, including:

- Overload
- Non-Reversing Starter
- Reversing Starter
- Wye/Delta (Star/Delta) Starter
- Two-Speed Starter
- Monitor

The default Operating Mode (Parameter 195) for the CEP9 Electronic Overload Relay is Overload (Network) in which the CEP9 Electronic Overload Relay operates like a traditional overload relay and has one of the output relays assigned as a Trip Relay. Users can use network commands to control the remaining output relays that are assigned as Normal output relays. One output relay must be assigned as a Trip Relay; otherwise, the CEP9 Electronic Overload Relay will go into Invalid Configuration Mode and trip on a configuration trip. Operating Modes on page 75 describes the functionality of all the available Operating Modes for the CEP9 Electronic Overload Relay and their associated configuration rules.

Operating Modes

Introduction

The CEP9 Electronic Overload Relay supports up to 54 Operating Modes which consist of configuration rules and logic to control typical full voltage motor starters including:

- Overload
- Non-Reversing Starter
- Reversing Starter
- Wye/Delta (Star/Delta) Starter
- Two Speed Starter
- Monitoring Device

This chapter explains the configuration rules, logic, and control wiring required for the available Operating Modes (Parameter 195). Failure to follow the configuration rules will cause the CEP9 Electronic Overload Relay to go into Invalid Configuration Mode and trip the CEP9 Electronic Overload Relay on a configuration trip.

Overload (Network)

The CEP9 Electronic Overload Relay's default Operating Mode (Parameter 195) is Overload (Network) in which the CEP9 Electronic Overload Relay operates as a traditional overload relay with one output relay assigned as a normally closed Trip Relay. Users can use network commands to control the remaining output relays that are assigned as Normal output relays.

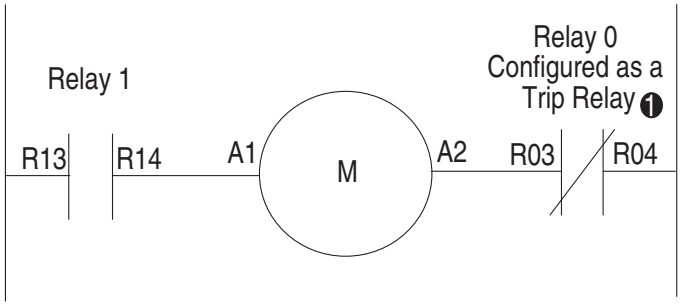
Rules

1. One output relay must be assigned as a Trip Relay. Set any of the Output Ptxx Assignments (Parameters 202-204) to Trip Relay.
2. Overload Trip must be enabled in TripEnableI (Parameter 183).

Wiring Diagram

The CEP9 Electronic Overload Relay is wired as a traditional overload relay with one of the output relays configured as a normally closed Trip Relay. The example below is a wiring diagram of a Non-Reversing Starter. Relay 0 is configured as a Trip Relay, and Relay 1 is configured as a normally open Normal Relay which receives commands from an automation controller to energize the contactor coil.

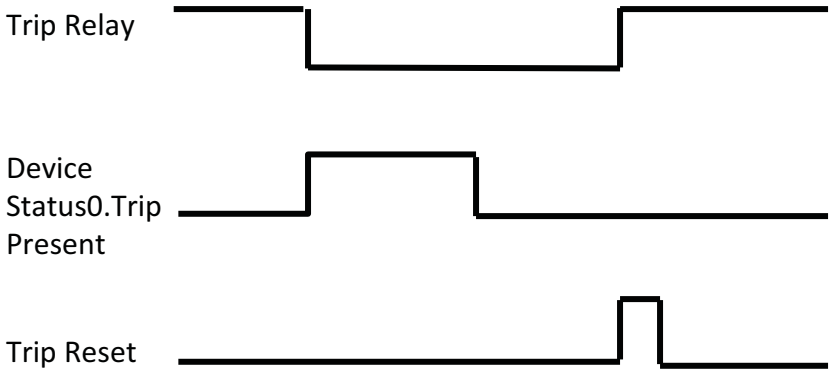
Figure 37 - Wiring Diagram



❶ Contact shown with supply voltage applied.

Timing Diagram

Figure 38 - Timing Diagram



Monitor (Custom)

The CEP9 Electronic Overload Relay's Monitor (Custom) Operating Mode allows the user to use the CEP9 Electronic Overload Relay as a monitoring device. No configuration rules apply in this operating mode if the motor protection features are disabled.

Rules

1. If any protection trips are enabled (excluding Configuration, NVS, and Hardware Fault trip), then set any of the Output Ptxx Assignments (Parameters 202...204) to the appropriate value of Trip Relay, Control Relay, Monitor Lx Trip Relay, or Monitor Lx Control Relay.

Wiring Diagram

Not Applicable

Timing Diagram

Not Applicable

Protective Trip and Warning Functions

Introduction

The purpose of this chapter is to provide detailed information regarding the protective trip and warning functions of the CEP9 Electronic Overload Relay. The protective trip and warning functions are organized into five sections:

- Current Based
- Voltage Based
- Power Based
- Control Based
- Analog Based

This chapter explains the trip and warning protection features of the CEP9 Electronic Overload Relay and the associated configuration parameters.

Current Based Protection

The CEP9 Electronic Overload Relay digitally monitors the electrical current consumed by an electric motor. This electric current information is used for the following protective trip and warning functions:

- Overload Trip/Warning
- Phase Loss Trip
- Ground Fault Trip/Warning
- Stall Trip
- Jam Trip/Warning
- Underload Trip/Warning
- Current Imbalance Trip/Warning
- Line Under Current Trip/Warning
- Line Over Current Trip/Warning
- Line Loss Trip/Warning

Current Trip Enable (Parameter 183) and Current Warning Enable (Parameter 189) are used to enable the respective current based protective trip and warning functions.

Table 52 - Current Trip Enable (Parameter 183)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Trip
														X		Phase Loss Trip
													X			Ground Fault Trip
												X				Stall Trip
											X					Jam Trip
										X						Underload Trip
									X							Current Imbalance Trip
								X								L1 Under Current Trip
							X									L2 Under Current Trip
						X										L3 Under Current Trip
					X											L1 Over Current Trip
				X												L2 Over Current Trip
			X													L3 Over Current Trip
		X														L1 Line Loss Trip
	X															L2 Line Loss Trip
X																L3 Line Loss Trip

Table 53 - Current Warning Enable (Parameter 189)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Warning
																Reserved
													X			Ground Fault Warning
																Reserved
											X					Jam Warning
										X						Underload Warning
									X							Current Imbalance Warning
								X								L1 Under Current Warning
							X									L2 Under Current Warning
						X										L3 Under Current Warning
					X											L1 Over Current Warning
				X												L2 Over Current Warning
			X													L3 Over Current Warning
		X														L1 Line Loss Warning
	X															L2 Line Loss Warning
X																L3 Line Loss Warning

Current Trip Status (Parameter 4) and Current Warning Status (Parameter 10) are used to monitor the respective current based protective trip and warning functions.

Table 54 - Current Trip Status (Parameter 4)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Trip
														X		Phase Loss Trip
													X			Ground Fault Current Trip
												X				Stall Trip
											X					Jam Trip
										X						Underload Trip
									X							Current Imbalance Trip
								X								L1 Under Current Trip
							X									L2 Under Current Trip
						X										L3 Under Current Trip
					X											L1 Over Current Trip
				X												L2 Over Current Trip
			X													L3 Over Current Trip
		X														L1 Line Loss Trip
	X															L2 Line Loss Trip
X																L3 Line Loss Trip

Table 55 - Current Warning Status (Parameter 10)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Warning
																Reserved
													X			Ground Fault Warning
																Reserved
											X					Jam Warning
										X						Underload Warning
									X							Current Imbalance Warning
								X								L1 Under Current Warning
							X									L2 Under Current Warning
						X										L3 Under Current Warning
					X											L1 Over Current Warning
				X												L2 Over Current Warning
			X													L3 Over Current Warning
		X														L1 Line Loss Warning
	X															L2 Line Loss Warning
X																L3 Line Loss Warning

Overload Protection

The CEP9 Electronic Overload Relay provides overload protection through true RMS current measurements of the individual phase currents of the connected motor. Based on the highest current measured, the programmed FLA Setting, and Trip Class, a thermal model that simulates the actual heating of the motor is calculated. Percent Thermal Capacity Utilized (Parameter 1) reports this calculated value and can be read via the communications network.

Overload Trip

The CEP9 Electronic Overload Relay will trip with an overload indication if:

- No trip currently exists
- Overload trip protection is enabled
- Current is present
- % Thermal Capacity Utilized reaches 100%

If the CEP9 Electronic Overload Relay trips on an overload, the following will occur:

- The TRIP/WARN LED will flash a red short-1 blink pattern,
- Bit 0 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Full Load Amps Setting

FLA (Parameter 171) is one of two parameters that affect the CEP9 Electronic Overload Relay's thermal capacity utilization algorithm. The installer enters the motor's full-load current rating into this parameter.

Table 56 - FLA (Parameter 171)

FLA (Parameter 171)	
Default Value	0.50 *(0.5…30 A Sensing Modules)*
	6.00 *(6…60 A Sensing Modules)*
	10.00 *(10…100 A Sensing Modules)*
	20.00 *(20…200 A Sensing Modules)*
Minimum Value	0.50
Maximum Value	65535.00
Parameter Type	UDINT
Size (Bytes)	4
Scaling Factor	100
Units	Amps

FLA2 (Parameter 177) is provided for programming the high-speed FLA value in two-speed motor applications. Activating FLA2 is described in Chapter 3.

Table 57 - FLA2 (Parameter 177)

FLA2 (Parameter 177)	
Default Value	0.50 *(0.5…30 A Sensing Modules)*
	6.00 *(6…60 A Sensing Modules)*
	10.00 *(10…100 A Sensing Modules)*
	20.00 *(20…200 A Sensing Modules)*
Minimum Value	0.50
Maximum Value	65535.00
Parameter Type	UDINT
Size (Bytes)	4
Scaling Factor	100
Units	Amps

USA & Canada Guidelines

- Motor Service Factor ≥ 1.15: For motors with a service factor rating of 1.15 or greater, program the FLA setting to the printed nameplate's full load current rating.
- Motor Service Factor < 1.15: For motors with a service factor rating less than 1.15, program the FLA setting to 90% of the printed nameplate's full load current rating.
- Wye-Delta (Y-Δ) Applications: Follow the application's service factor instructions, except divide the printed nameplate's full-load current rating by 1.73.

Outside USA & Canada Guidelines

- Maximum Continuous Rated (MCR) Motors: Program the FLA setting to the printed nameplate's full-load current rating.
- Star-Delta (Y-Δ) Applications: Follow the MCR instructions, except divide the printed nameplate's full-load current rating by 1.73.

Trip Class

Trip Class is the second of two parameters that affect the CEP9 Electronic Overload Relay's thermal capacity utilization algorithm. Trip class is defined as the maximum time (in seconds) for an overload trip to occur when the motor's operating current is six times its rated current. The CEP9 Electronic Overload Relay offers an adjustable trip class range of 5...30. The user enters the applications trip class into Trip Class (Parameter 172).

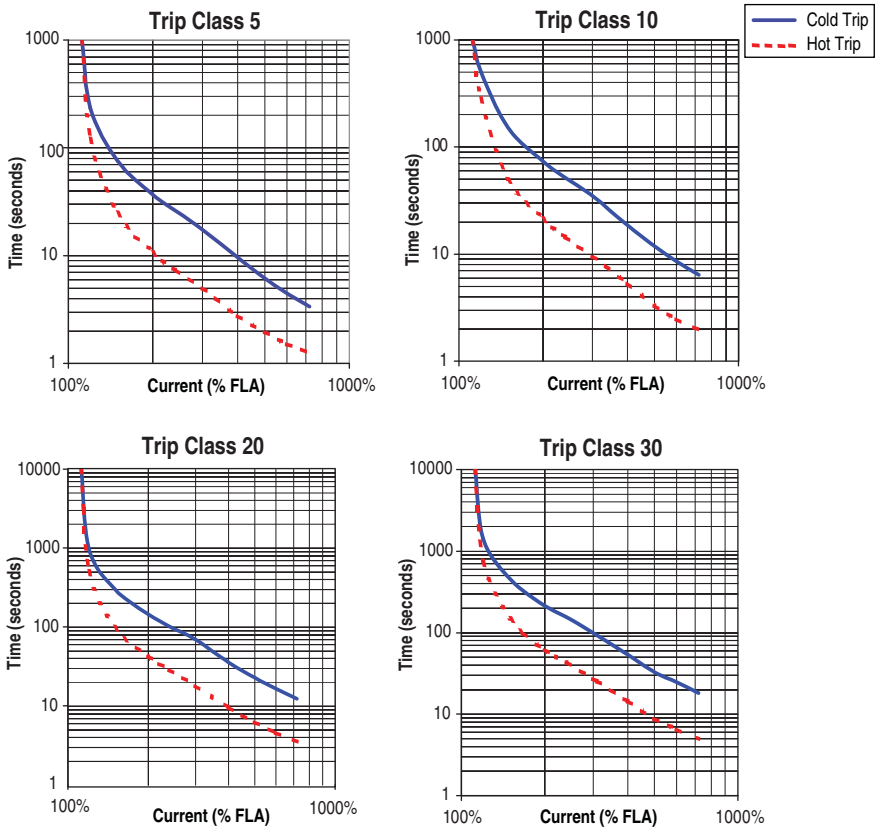
Table 58 - Trip Class (Parameter 172)

Trip Class (Parameter 172)	
Default Value	10
Minimum Value	5
Maximum Value	30
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Trip Curves

The following figures illustrate the CEP9 Electronic Overload Relay's time-current characteristics for trip classes 5, 10, 20, and 30.

Figure 39 - Time-Current Characteristics for Trip Classes 5, 10, 20, & 30



For trip class time-current characteristics other than 5, 10, 20, or 30, scale the Class 10 trip time according to the following table:

Table 59 - Time-Current Characteristic Scaling Factors

Trip Class	Trip Class 10 Multiplier	Trip Class	Trip Class 10 Multiplier	Trip Class	Trip Class 10 Multiplier
5	0.5	14	1.4	23	2.3
6	0.6	15	1.5	24	2.4
7	0.7	16	1.6	25	2.5
8	0.8	17	1.7	26	2.6
9	0.9	18	1.8	27	2.7
10	1.0	19	1.9	28	2.8
11	1.1	20	2.0	29	2.9
12	1.2	21	2.1	30	3.0
13	1.3	22	2.2		

Automatic/Manual Reset

Overload Reset Mode (Parameter 173) allows the user to select the reset mode for the CEP9 Electronic Overload Relay after an overload or thermistor (PTC) trip. If an overload trip occurs and automatic reset mode is selected, the CEP9 Electronic Overload Relay will automatically reset when the value stored in % Thermal Capacity Utilized (Parameter 1) falls below the value stored in Overload Reset Level (Parameter 174). If manual reset mode is selected, the CEP9 Overload Relay can be manually reset after the % Thermal Capacity Utilized is less than the OL Reset Level.

Table 60 - Overload Reset Mode (Parameter 173)

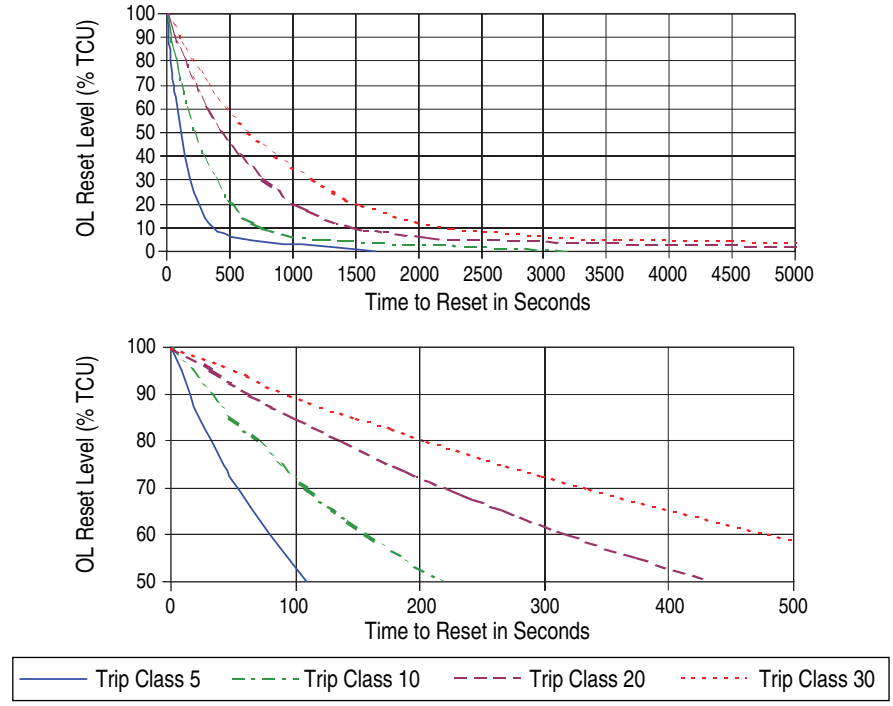
Overload Reset Mode (Parameter 173)	
Default Value	0 = Manual
Minimum Value	0 = Manual
Maximum Value	1 = Automatic
Parameter Type	BOOL
Size (Bytes)	1
Scaling Factor	1
Units	

Table 61 - Overload Reset Level (Parameter 174)

Overload Reset Level (Parameter 174)	
Default Value	75
Minimum Value	0
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%TCU

Overload Reset Level (Parameter 174) is adjustable from 1 to 100% TCU. The following figures illustrate the typical overload reset time delay when Overload Reset Level is set to 75% TCU.

Figure 40 - Overload Reset Times



ATTENTION: In explosive environment applications, Overload Reset Mode (Parameter 173) must be set to Manual.

ATTENTION: In an explosive environment application Overload Reset Level (Parameter 174) must be set as low as possible or in accordance with the motor thermal time constant.

Overload Warning

The CEP9 Electronic Overload Relay will indicate an overload warning if:

- No warning currently exists
- Overload warning is enabled
- Current is present
- % Thermal Capacity Utilized is equal to or greater than Overload Warning Level

When the overload warning conditions are satisfied, the:

- TRIP/WARN LED status indicator will flash a yellow short-1 blink pattern
- Bit 0 in Current Warning Status (Parameter 10) will set to 1

- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as Warning Alarm will close

Overload Warning Level (Parameter 175) can be used as an alert for an impending overload trip and is adjustable from 0...100% TCU.

Table 62 - Overload Warning Level (Parameter 175)

Overload Warning Level (Parameter 175)	
Default Value	85
Minimum Value	0
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%TCU

Time to Trip

When the measured motor current exceeds the trip rating of the CEP9 Electronic Overload Relay, Overload Time to Trip (Parameter 2) indicates the estimated time remaining before an overload trip occurs. When the measured current is below the trip rating, the Overload Time to Trip value is reported as 9,999 seconds.

Table 63 - Overload Time to Trip (Parameter 2)

Overload Time to Trip (Parameter 2)	
Default Value	9999
Minimum Value	0
Maximum Value	9999
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Sec

Time To Reset

After an overload trip, the CEP9 Electronic Overload Relay will report the time remaining until the device can be reset through Overload Time to Reset (Parameter 3). When the % Thermal Capacity Utilized value falls to or below the Overload Reset Level (Parameter 174), the Overload Time to Reset value will indicate zero until the overload trip is reset. After an overload trip is reset, the Overload Time to Reset value is reported as 0 seconds.

Table 64 - Overload Time to Reset (Parameter 3)

Overload Time to Reset (Parameter 3)	
Default Value	0
Minimum Value	0
Maximum Value	9999
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Sec

Non-Volatile Thermal Memory

The CEP9 Electronic Overload Relay includes a non-volatile circuit to provide thermal memory. The time constant of the circuit corresponds to a Trip Class 20 setting. During normal operation, the thermal memory circuit is continuously monitored and updated to accurately reflect the thermal capacity utilization of the connected motor. If power is removed, the thermal memory of the circuit decays at a rate equivalent to the cooling of a Trip Class 20 application. When the power is re-applied, the CEP9 Electronic Overload Relay checks the thermal memory circuit voltage to determine the initial value of % Thermal Capacity Utilized (Parameter 1).

Phase Loss Protection

A high current imbalance, or phase failure, can be caused by defective contacts in a contactor or circuit breaker, loose terminals, blown fuses, sliced wires, or faults in the motor. When a phase failure exists, the motor can experience an additional temperature rise or excessive mechanical vibration. This may result in a degradation of the motor insulation or increased stress on the motor bearings. Rapid phase loss detection helps to minimize the potential damage and loss of production.

Phase Loss Inhibit Time

Phase Loss Inhibit Time (Parameter 239) allows the user to inhibit a phase loss trip from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 65 - Phase Loss Inhibit Time (Parameter 239)

Phase Loss Inhibit Time (Parameter 239)	
Default Value	0
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

IMPORTANT The phase loss inhibit timer starts after the maximum phase of load current transitions from 0 A to 30% of the device's minimum FLA Setting. The CEP9 Electronic Overload Relay does not begin monitoring for a phase loss condition until the Phase Loss Inhibit Time expires.

Phase Loss Trip

The CEP9 Electronic Overload Relay will trip with a phase loss indication if:

- No trip currently exists
- Phase Loss Protection is enabled
- Current is Present
- Phase Loss Inhibit Time has expired
- Current Imbalance is equal to or greater than 100% for a time period greater than the programmed Phase Loss Trip Delay

If the CEP9 Electronic Overload Relay trips on a phase loss, the:

- TRIP/WARN LED status indicator will flash a red short-2 blink pattern
- Bit 1 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 of Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Phase Loss Trip Delay

Phase Loss Trip Delay (Parameter 240) allows the user to define the time period for which a phase loss condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 66 - Phase Loss Trip Delay (Parameter 240)

Phase Loss Trip Delay (Parameter 240)	
Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Ground Fault Current Protection

In isolated or high impedance-grounded systems, core-balanced current sensors are typically used to detect low level ground faults caused by insulation breakdowns or entry of foreign objects. Detection of such ground faults can be used to interrupt the system to prevent further damage or to alert the appropriate personnel to perform timely maintenance.

The CEP9 Electronic Overload Relay provides core-balanced ground fault current detection capability, with the option of enabling Ground Fault Trip, Ground Fault Warning, or both. The ground fault detection method and range depends upon the catalog number of the CEP9 Sensing Module and Control Module ordered.

Table 67 - Ground Fault Capabilities

Catalog Number	Ground Fault Method	Ground Fault Trip/Warning Range
CEP9-ESM-IG-___-___	Internal	0.5…5.0 A
CEP9-ESM-VIG-___-___		
CEP9-EIOGP-22-____	External ❶	0.02…5.0 A
CEP9-EIOGP-42-____		

❶ One of the following Catalog Number CEP9-CBCT_ Core Balance Ground Fault Sensors must be used:

1 — Ø 20 mm window
2 — Ø 40 mm window
3 — Ø 65 mm window
4 — Ø 85 mm window

ATTENTION: The CEP9 Electronic Overload Relay is not a ground fault circuit interrupt or for personal protection as defined in Article 100 of the NEC.

ATTENTION: The CEP9 Electronic Overload Relay is not intended to signal a disconnecting means to open the faulted current. A disconnecting device must be capable of interrupting the maximum available fault current of the system on which it is used.

Ground Fault Type

The CEP9 Electronic Overload Relay has two options available to measure ground fault current. Ground Fault Type (Parameter 241) allows the user to select the internal option or the external option with the appropriate measurement range.

Table 68 - Ground Fault Type (Parameter 241)

Ground Fault Type (Parameter 241)	
Default Value	1 = Internal 0.500…5.000 A
Range	1 = Internal 0.500…5.000 A 2 = External 0.020…0.100 A 3 = External 0.100…0.500 A 4 = External 0.200…1.000 A 5 = External 1.000…5.000 A
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Ground Fault Maximum Inhibit

Ground faults can quickly rise from low-level arcing levels to short circuit magnitudes. A motor starting contactor may not have the necessary rating to interrupt a high magnitude ground fault. In these circumstances it is desirable for an upstream circuit breaker with the proper rating to interrupt the ground fault.

When enabled, Ground Fault Maximum Inhibit (Parameter 248), inhibits a ground fault trip from occurring when the ground fault current exceeds the maximum range of the core-balance sensor (approximately 6.5 A).

Table 69 - Overload Reset Level (Parameter 248)

Overload Reset Level (Parameter 248)	
Default Value	0 = Disable
Minimum Value	0 = Disable
Maximum Value	1 = Enable
Parameter Type	BOOL
Size (Bytes)	1
Scaling Factor	1
Units	

Ground Fault Filter

An CEP9 Electronic Overload Relay has the capability to filter ground fault currents for High Resistance Grounded (HRG) systems from its current-based protection trip and warning functions which includes:

- Thermal Overload
- Current Imbalance
- Jam
- Stall

The Ground Fault Filter is useful for smaller-sized motors that trip unexpectedly due to a controlled ground fault current that is significant relative to the current draw of the electric motor. Ground Fault Filter (Parameter 131) allows the user to enable this filter.

Table 70 - Ground Fault Filter (Parameter 247

Ground Fault Filter (Parameter 247)	
Default Value	0 = Disable
Minimum Value	0 = Disable
Maximum Value	1 = Enable
Parameter Type	BOOL
Size (Bytes)	1
Scaling Factor	1
Units	

This filter only disables the effects of the ground fault current from the current based motor protection trip and warning functions. Current-based diagnostic data will be reported unfiltered when this feature is enabled.

Ground Fault Inhibit Time

Ground Fault Inhibit Time (Parameter 242) allows the user to inhibit a ground fault trip and warning from occurring during the motor starting sequence and is adjustable from 0...250 seconds. The ground fault inhibit time begins when the Current Present (bit 3) or Ground Fault Current Present (bit 4) is set in Device Status 0 (Parameter 20).

Table 71 - Ground Fault Inhibit Time (Parameter 242

Ground Fault Inhibit Time (Parameter 242)	
Default Value	0
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Table 72 - Device Status 0 (Parameter 20)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Trip Present
														X		Warning Present
													X			Invalid Configuration
												X				Current Present
											X					Ground Fault Current Present
										X						Voltage Present
									X							Emergency Start Enabled
								X								DeviceLogix Enabled
							X									Feedback Timeout Enabled
						X										Operator Station Present
					X											Voltage Sensing Present
				X												Internal Ground Fault Sensing Present
			X													External Ground Fault Sensing Present
		X														PTC Sensing
	X															Ready
																Reserved

Ground Fault Trip

The CEP9 Electronic Overload Relay will trip with a ground fault indication if:

- No trip currently exists
- Ground fault protection is enabled
- Ground fault current is present
- Ground Fault Inhibit Time has expired
- Ground Fault Current is equal to or greater than the Ground Fault Trip Level for a time period greater than the Ground Fault Trip Delay

If the CEP9 Electronic Overload Relay trips on a ground fault, the:

- TRIP/WARN LED will flash a red 3-short blink pattern
- Bit 2 in Current Trip Status (Parameter 4) will set to 1

- Bit 0 of Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Ground Fault Trip Delay

Ground Fault Trip Delay (Parameter 243) allows the user to define the time period a ground fault condition must be present before a trip occurs and is adjustable from 0.0...25.0 s.

Table 73 - Ground Fault Trip Delay (Parameter 243)

Ground Fault Trip Delay (Parameter 243)	
Default Value	0.5
Minimum Value	0.0
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Ground Fault Trip Level

Ground Fault Trip Level (Parameter 244) allows the user to define the ground fault current in which the CEP9 Electronic Overload Relay will trip and is adjustable from:

- 0.500...5.00 A (Internal)
- 0.020...5.00 A (External)

Table 74 - Ground Fault Trip Level (Parameter 244)

Ground Fault Trip Level (Parameter 244)	
Default Value	2.5
Minimum Value	0.5 (internal); 0.02 (external)
Maximum Value	5.00
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	100
Units	Amps

IMPORTANT The ground fault inhibit timer starts after the maximum phase load current transitions from 0 A to 30% of the device's minimum FLA rating or the ground fault current is greater than or equal to 50% of the device's minimum ground fault current rating. The CEP9 Electronic Overload Relay does not begin monitoring for a ground fault condition until the Ground Fault Current Inhibit Time expires.

Ground Fault Warning

The CEP9 Electronic Overload Relay will indicate a ground fault warning if:

- No warning currently exists
- Ground Fault Warning is enabled
- Current is present
- Ground Fault Inhibit Time has expired

- Ground Fault Current is equal to or greater than the Ground Fault Warning Level for a time period greater than the Ground Fault Warning Delay.

When the ground fault warning conditions are satisfied, the:

- TRIP/WARN LED status indicator will flash a yellow 3-short blink pattern
- Bit 2 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 of Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Ground Fault Warning Level

Ground Fault Warning Level (Parameter 246) allows the user to define the ground fault current at which the CEP9 Electronic Overload Relay will indicate a warning and is adjustable from 0.20...5.00 A.

Table 75 - Ground Fault Warning Level (Parameter 246)

Ground Fault Warning Level (Parameter 246)	
Default Value	2.00
Minimum Value	0.20
Maximum Value	5.00
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	100
Units	Amps

Ground Fault Warning Delay

Ground Fault Warning Delay (Parameter 245) allows the user to define the time period (adjustable from 0.0...25.0 s) for which a ground fault condition must be present before a warning occurs.

Table 76 - Ground Fault Warning Delay (Parameter 245)

Ground Fault Warning Delay (Parameter 245)	
Default Value	0.0
Minimum Value	0.0
Maximum Value	25.00
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Stall Protection

A motor stalls when its inrush current lasts for a longer than normal period of time during its starting sequence. As a result, the motor heats up very rapidly and reaches the temperature limit of its insulation. Rapid stall detection during the starting sequence can extend the motor's life, as well as minimize potential damage and loss of production. The CEP9 Electronic Overload Relay can monitor for this condition with its Stall Trip function and stop the motor before damage and loss of production can occur.

Stall Trip

The CEP9 Electronic Overload Relay will trip with a Stall Trip indication when:

- No trip currently exists
- Stall protection is enabled
- Current is present
- The maximum phase current is greater than the Stall Trip Level for a time period greater than the Stall Enabled Time

If the CEP9 Electronic Overload Relay trips on a stall, the:

- TRIP/WARN LED status indicator will flash a red 4-short blink pattern
- Bit 3 in Current Trip Status Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Stall Enabled Time

Stall Enabled Time (Parameter 249) allows the user to adjust the time the CEP9 Electronic Overload Relay monitors for a stall condition during the motor starting sequence and is adjustable from 0...250 s.

Table 77 - Stall Enabled Time (Parameter 249)

Stall Enabled Time (Parameter 249)	
Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Stall Trip Level

Stall Trip Level (Parameter 250) allows the installer to define the locked rotor current and is adjustable from 100...600% of the FLA Setting (Parameter 171).

Table 78 - Stall Trip Level (Parameter 250)

Stall Trip Level (Parameter 250)	
Default Value	600
Minimum Value	100
Maximum Value	600
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	%FLA

IMPORTANT Stall Protection is only enabled during the motor starting sequence. If the maximum phase of load current falls below the programmed Stall Trip Level before the Stall Enabled Time elapses, the CEP9 Electronic Overload Relay disables Stall Protection until the next motor starting sequence.

IMPORTANT The CEP9 Electronic Overload Relay considers a motor to have begun its starting sequence if the maximum phase of motor current transitions from 0A to approximately 30% of the device's minimum FLA Setting.

Jam Protection

A motor goes into a jam condition when a running motor begins to consume current greater than50% of the motor's nameplate rating. An example of this condition could be an overloaded conveyor or jammed gear. These conditions can result in the overheating of the motor and equipment damage. The CEP9 Electronic Overload Relay can monitor for this condition with its Jam Trip and Warning function to detect for a rapid jam fault to minimize damage and loss of production.

Jam Inhibit Time

Jam Inhibit Time (Parameter 251) allows the installer to inhibit a jam trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 s.

Table 79 - Jam Trip Inhibit Time (Parameter 251)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Jam Trip

The CEP9 Electronic Overload Relay will trip with a jam indication if:

- No trip currently exists
- Jam Trip is enabled
- Jam Inhibit Time has expired
- The maximum phase current is greater than the Jam Trip Level for a time period greater than the Jam Trip Delay.

If the CEP9 Electronic Overload Relay trips on a jam, the:

- TRIP/WARN LED status indicator will flash a red 5-short blink pattern
- Bit 4 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Jam Trip Delay

Jam Trip Delay (Parameter 252) allows the installer to define the time period a jam condition must be present before a trip occurs. It is adjustable from 0.1...25.0 s.

Table 80 - Jam Trip Delay (Parameter 252)

Default Value	5.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Jam Trip Level

Jam Trip Level (Parameter 253) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on a jam. It is user-adjustable from 50...600% of the FLA Setting (Parameter 171).

Table 81 - Jam Trip Level (Parameter 253)

Default Value	250
Minimum Value	50
Maximum Value	600
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	%FLA

IMPORTANT The Jam Inhibitor timer starts after the maximum phase of load current transitions from 0 A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for a jam condition until the Jam Inhibit Time expires.

Jam Warning

The CEP9 Electronic Overload Relay will indicate a Jam warning if:

- No warning currently exists
- Jam Warning is enabled
- Current is present
- Jam Inhibit Time has expired
- The maximum phase current is equal to or greater than the Jam Warning Level

When the Jam Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 5-short blink pattern
- Bit 4 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Jam Warn Level

Jam Warn Level (Parameter 254) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 50...600% for the FLA Setting (Parameter 171).

Table 82 - Jam Warning Level (Parameter 254)

Default Value	150
Minimum Value	50
Maximum Value	600
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	%FLA

IMPORTANT The Jam Warning function does not include a time delay feature. Once the Jam Inhibit Time has expired, the Jam Warning indication is instantaneous.

Underload Protection

Motor current less than a specific level may indicate a mechanical malfunction in the installation, such as a torn conveyor belt, damaged fan blade, broken shaft, or worn tool. Such conditions may not harm the motor, but they can lead to loss of production. Rapid underload fault detection helps to minimize damage and loss of production.

The CEP9 Electronic Overload Relay can monitor for this condition with its Underload Trip and Warning function to detect for a rapid underload fault to minimize damage and loss of production.

Underload Inhibit Time

Underload Inhibit Time (Parameter 255) allows the installer to inhibit an underload trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 s.

Table 83 - Underload Inhibit Time (Parameter 255)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Underload Trip

The CEP9 Electronic Overload Relay will trip with an underload indication if:

- No trip currently exists
- Underload Trip is enabled
- Current is present
- Underload Inhibit Time has expired
- Minimum phase current is less than the Underload Trip Level for a time period greater than the Underload Trip Delay.

If the CEP9 Electronic Overload Relay trips on an underload, the:

- TRIP/WARN LED status indicator will flash a red 6-short blink pattern
- Bit 5 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Underload Trip Delay

Underload Trip Delay (Parameter 256) allows the installer to define the time period an underload condition must be present before a trip occurs. It is adjustable from 0.1...25.0 s.

Table 84 - Underload Trip Delay (Parameter 256)

Default Value	5.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Underload Trip Level

Underload Trip Level (Parameter 257) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on an underload. It is user-adjustable from 10...100% of the FLA Setting (Parameter 171).

Table 85 - Underload Trip Level (Parameter 257)

Default Value	50
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Underload Inhibit Timer starts after the maximum phase of load current transitions from 0 A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an underload condition until the Underload Inhibit Time expires.

IMPORTANT For any given application, the practical limit of the Underload Trip Level (Parameter 246), will be dependent on the FLA Setting and the lower limit of the CEP9 Electronic Overload Relay's current measurement capability.

Underload Warning

The CEP9 Electronic Overload Relay will indicate an underload warning if:

- No warning currently exists
- Underload Warning is enabled
- Current is present
- Underload Inhibit Time has expired
- The minimum phase current is less than the Underload Warning Level

When the Underload Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 6-short blink pattern
- Bit 5 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Underload Warning Level

Underload Warning Level (Parameter 258) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 10...100% for the FLA Setting (Parameter 171).

Table 86 - Underload Warning Level (Parameter 258)

Default Value	70
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Underload Warning function does not include a time delay feature. Once the Underload Inhibit Time has expired, the Underload Warning indication is instantaneous.

Current Imbalance Protection

A current imbalance can be caused by an imbalance in the voltage supply, unequal motor winding impedance, or long and varying wire lengths. When a current imbalance exists, the motor can experience an additional temperature rise, resulting in degradation of the motor insulation and reduction of life expectancy. The CEP9 Electronic Overload Relay can monitor for this condition with its Current Imbalance Trip and Warning function to detect for a rapid current imbalance fault to minimize damage and loss of production.

Current Imbalance can be defined by the following equation:

$$\%CI = 100\% * (Id/Ia)$$

where

%CI = Percent Current Imbalance
Id = Maximum Deviation from the Average Current
Ia = Average Current

Current Imbalance Inhibit Time

Current Imbalance Inhibit Time (Parameter 259) allows the installer to inhibit a current imbalance trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 s.

Table 87 - Current Imbalance Inhibit Time (Parameter 259)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Current Imbalance Trip

The CEP9 Electronic Overload Relay will trip with a current imbalance indication if:

- No trip currently exists
- Current Imbalance Trip is enabled
- Current is present
- Current Imbalance Inhibit Time has expired
- The Current Imbalance (parameter 52) is greater than the Current Imbalance Trip Level for a time period greater than the Current Imbalance Trip Delay.

If the CEP9 Electronic Overload Relay trips on a current imbalance, the:

- TRIP/WARN LED status indicator will flash a red 7-short blink pattern
- Bit 6 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close

Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed).

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Current Imbalance Trip Delay

Current Imbalance Trip Delay (Parameter 260) allows the installer to define the time period a current imbalance condition must be present before a trip occurs. It is adjustable from 0.1...25.0 s.

Table 88 - Current Imbalance Trip Delay (Parameter 260)

Default Value	5.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Current Imbalance Trip Level

Current Imbalance Trip Level (Parameter 261) allows the installer to define the percentage at which the CEP9 Electronic Overload Relay will trip on a current imbalance. It is user-adjustable from 10...100%.

Table 89 - Current Imbalance Trip Level (Parameter 261)

Default Value	35
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Current Imbalance Inhibit Timer starts after a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for a current imbalance condition until the Current Imbalance Inhibit Time expires.

Current Imbalance Warning

The CEP9 Electronic Overload Relay will indicate a current imbalance warning if:

- No warning currently exists
- Current Imbalance Warning is enabled
- Current is present
- Current Imbalance Inhibit Time has expired
- The current imbalance (parameter 52) is greater than the Current Imbalance Warning Level

When the Current Imbalance Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 7-short blink pattern
- Bit 6 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Current Imbalance Warning Level

Current Imbalance Warning Level (Parameter 262) allows the user to define the percentage at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 10...100%.

Table 90 - Current Imbalance Warning Level (Parameter 262)

Default Value	20
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Current Imbalance Warning function does not include a time delay feature. Once the Current Imbalance Inhibit Time has expired, the Current Imbalance Warning indication is instantaneous.

Line Under Current Protection

For non-motor applications when the measured current is less than a specific level for a specific phase may indicate an electrical malfunction, such as bad resistive heater element or non-operating incandescent light bulb. Such conditions may not harm the power system, but it can lead to loss of production or certification noncompliance.

The CEP9 Electronic Overload Relay can monitor for an under current condition per phase with its Line Under Current Trip and Warning function to detect for a rapid under current in a specific phase to minimize damage and loss of production.

Under Current Inhibit Time

Under Current Inhibit Time (Parameter 265) allows the installer to inhibit an L1, L2, and L3 Under Current trip and warning from occurring during a load starting sequence. It is adjustable from 0...250 seconds.

Table 91 - Under Current Inhibit Time (Parameter 265)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

L1 Under Current Trip

The CEP9 Electronic Overload Relay will trip with a L1 Under Current indication if:

- No trip currently exists
- L1 Under Current Trip is enabled
- Current is present
- Under Current Inhibit Timer has expired
- L1 Percent FLA (Parameter 47) is less than the L1 Under Current Trip Level for a time period greater than the L1 Under Current Trip Delay.
- If the CEP9 Electronic Overload Relay trips on a L1 Under Current, the:
- TRIP/WARN LED status indicator will flash a red 8-short blink pattern
- Bit 7 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L1 Under Current Trip Delay

L1 Under Current Trip Delay (Parameter 266) allows the installer to define the time period an L1 Under Current condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 92 - L1 Under Current Trip Delay (Parameter 266)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

L1 Under Current Trip Level

L1 Under Current Trip Level (Parameter 267) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on a L1 Under Current. It is user-adjustable from 10...100% of the FLA Setting (Parameter 171).

Table 93 - L1 Under Current Trip Level (Parameter 267)

Default Value	35
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Under Current Inhibit Timer starts after the maximum phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under current condition until the Under Current Inhibit Time expires.

IMPORTANT For any given application, the practical limit of the L1 Under Current Trip Level (Parameter 267), will be dependent on the FLA Setting and the lower limit of the CEP9 Electronic Overload Relay's current measurement capability

L1 Under Current Warning

The CEP9 Electronic Overload Relay will indicate an L1 Under Current warning if:

- No warning currently exists
- L1 Under Current Warning is enabled
- Current is present
- The Under Current Inhibit Timer has expired
- L1 Percent FLA (Parameter 47) is less than the L1 Under Current Warning Level

When the L1 Under Current Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 8-short blink pattern
- Bit 7 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

L1 Under Current Warning Level

L1 Under Current Warning Level (Parameter 268) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a L1 Under Current warning. It is user-adjustable from 10...100% for the FLA Setting (Parameter 171).

Table 94 - L1 Under Current Warning Level (Parameter 268)

Default Value	40
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The L1 Under Current Warning function does not include a time delay feature. Once the Under Current Inhibit Timer has expired, the L1 Under Current Warning indication is instantaneous.

L2 Under Current Trip

The CEP9 Electronic Overload Relay will trip with a L2 Under Current indication if:

- No trip currently exists
- L2 Under Current Trip is enabled
- Current is present
- Under Current Inhibit Timer has expired
- L2 Percent FLA (Parameter 48) is less than the L2 Under Current Trip Level for a time period greater than the L2 Under Current Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L2 Under Current, the:

- TRIP/WARN LED status indicator will flash a red 9-short blink pattern
- Bit 8 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close

- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L2 Under Current Trip Delay

L2 Under Current Trip Delay (Parameter 269) allows the installer to define the time period an L2 Under Current condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 95 - L2 Under Current Trip Delay (Parameter 269)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

L2 Under Current Trip Level

L2 Under Current Trip Level (Parameter 270) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on a L2 Under Current. It is user-adjustable from 10...100% of the FLA Setting (Parameter 171).

Table 96 - L2 Under Current Trip Level Parameter 270)

Default Value	35
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Under Current Inhibit Timer starts after the maximum phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under current condition until the Under Current Inhibit Time expires.

IMPORTANT For any given application, the practical limit of the L2 Under Current Trip Level (Parameter 270), will be dependent on the FLA Setting and the lower limit of the CEP9 Electronic Overload Relay's current measurement capability

L2 Under Current Warning

The CEP9 Electronic Overload Relay will indicate an L2 Under Current warning if:

- No warning currently exists
- 2 Under Current Warning is enabled
- Current is present
- The Under Current Inhibit Timer has expired
- 2 Percent FLA (Parameter 48) is less than the L2 Under Current Warning Level

When the L2 Under Current Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 9-short blink pattern
- Bit 8 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

L2 Under Current Warning Level

L2 Under Current Warning Level (Parameter 271) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a L2 Under Current warning. It is user-adjustable from 10...100% for the FLA Setting (Parameter 171).

Table 97 - L2 Under Current Warning Level (Parameter 271)

Default Value	40
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The L2 Under Current Warning function does not include a time delay feature. Once the Under Current Inhibit Timer has expired, the L2 Under Current Warning indication is instantaneous.

L3 Under Current Trip

The CEP9 Electronic Overload Relay will trip with a L3 Under Current indication if:

- No trip currently exists
- L3 Under Current Trip is enabled
- Current is present
- Under Current Inhibit Timer has expired
- Percent FLA (Parameter 49) is less than the L3 Under Current Trip Level for a time period greater than the L3 Under Current Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L3 Under Current, the:

- TRIP/WARN LED status indicator will flash a red 10-short blink pattern
- Bit 9 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

IMPORTANT L3 Under Current Trip Delay (Parameter 272) allows the installer to define the time period an L3 Under Current condition must be present before a trip occurs. It is adjustable from 0.1…25.0 seconds

Table 98 - L3 Under Current Trip Delay (Parameter 272)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

L3 Under Current Trip Level

L3 Under Current Trip Level (Parameter 273) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on a L3 Under Current. It is user-adjustable from 10...100% of the FLA Setting (Parameter 171).

Table 99 - L3 Under Current Trip Level (Parameter 273)

Default Value	35
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Under Current Inhibit Timer starts after the maximum phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under current condition until the Under Current Inhibit Time expires.

IMPORTANT For any given application, the practical limit of the L3 Under Current Trip Level (Parameter 273), will be dependent on the FLA Setting and the lower limit of the CEP9 Electronic Overload Relay's current measurement capability

L3 Under Current Warning

The CEP9 Electronic Overload Relay will indicate an L3 Under Current warning if:

- No warning currently exists
- L3 Under Current Warning is enabled
- Current is present
- The Under Current Inhibit Timer has expired
- L3 Percent FLA (Parameter 49) is less than the L3 Under Current Warning Level

When the L3 Under Current Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 10-short blink pattern
- Bit 9 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

L3 Under Current Warning Level

L3 Under Current Warning Level (Parameter 274) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a L3 Under Current warning. It is user-adjustable from 10...100% for the FLA Setting (Parameter 171).

Table 100 - L3 Under Current Warning Level (Parameter 274)

Default Value	40
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The L3 Under Current Warning function does not include a time delay feature. Once the Under Current Inhibit Timer has expired, the L3 Under Current Warning indication is instantaneous.

Line Over Current Protection

For non-motor applications when the measured current is greater than a specific level for a specific phase may indicate an electrical malfunction, such as bad resistive heater element. Such conditions could harm the power system over a period of time which could lead to loss of production.

The CEP9 Electronic Overload Relay can monitor for an over current condition per phase with its Line Over Current Trip and Warning function to detect for a rapid over current in a specific phase to minimize damage and loss of production.

Over Current Inhibit Time

Over Current Inhibit Time (Parameter 275) allows the installer to inhibit an L1, L2, and L3 Over Current trip and warning from occurring during a load starting sequence. It is adjustable from 0...250 seconds.

Table 101 - Over Current Inhibit Time (Parameter 275)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

L1 Over Current Trip

The CEP9 Electronic Overload Relay will trip with a L1 Over Current indication if:

- No trip currently exists
- L1 Over Current Trip is enabled

- Current is present
- Over Current Inhibit Timer has expired
- L1 Percent FLA (Parameter 47) is greater than the L1 Over Current Trip Level for a time period greater than the L1 Over Current Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L1 Over Current, the:

- TRIP/WARN LED status indicator will flash a red 11-short blink pattern
- Bit 10 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L1 Over Current Trip Delay

L1 Over Current Trip Delay (Parameter 276) allows the installer to define the time period a L1 Over Current condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 102 - L1 Over Current Trip Delay (Parameter 276)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

L1 Over Current Trip Level

L1 Over Current Trip Level (Parameter 277) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on a L1 Over Current. It is user-adjustable from 10...100% of the FLA Setting (Parameter 171).

Table 103 - L1 Over Current Trip Level (Parameter 277)

Default Value	100
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Over Current Inhibit Timer starts after the maximum phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over current condition until the Over Current Inhibit Time expires.

L1 Over Current Warning

The CEP9 Electronic Overload Relay will indicate an L1 Over Current warning if:

- No warning currently exists
- 1 Over Current Warning is enabled
- Current is present
- The Over Current Inhibit Timer has expired
- 1 Percent FLA (Parameter 47) is greater than the L1 Over Current Warning Level

When the L1 Over Current Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 11-short blink pattern
- Bit 10 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1

- Any relay outputs configured as a Warning Alarm will close

L1 Over Current Warning Level

L1 Over Current Warning Level (Parameter 278) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a L1 Over Current warning. It is user-adjustable from 10...100% for the FLA Setting (Parameter 171).

Table 104 - L1 Over Current Warning Level (Parameter 278)

Default Value	90
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The L1 Over Current Warning function does not include a time delay feature. Once the Over Current Inhibit Timer has expired, the L1 Over Current Warning indication is instantaneous.

L2 Over Current Trip

The CEP9 Electronic Overload Relay will trip with a L2 Over Current indication if:

- No trip currently exists
- 2 Over Current Trip is enabled
- Current is present
- Over Current Inhibit Timer has expired
- 2 Percent FLA (Parameter 48) is greater than the L2 Over Current Trip Level for a time period greater than the L2 Over Current Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L2 Over Current, the:

- TRIP/WARN LED status indicator will flash a red 12-short blink pattern
- Bit 11 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L2 Over Current Trip Delay

L2 Over Current Trip Delay (Parameter 279) allows the installer to define the time period a L2 Over Current condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 105 - L2 Over Current Trip Delay (Parameter 279)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

L2 Over Current Trip Level

L2 Over Current Trip Level (Parameter 280) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on a L2 Over Current. It is user-adjustable from 10...100% of the FLA Setting (Parameter 171)

Table 106 - L2 Over Current Trip Level (Parameter 280).

Default Value	100
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Over Current Inhibit Timer starts after the maximum phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over current condition until the Over Current Inhibit Time expires.

L2 Over Current Warning

The CEP9 Electronic Overload Relay will indicate an L2 Over Current warning if:

- No warning currently exists
- 2 Over Current Warning is enabled
- Current is present
- The Over Current Inhibit Timer has expired
- 2 Percent FLA (Parameter 48) is greater than the L2 Over Current Warning Level

When the L2 Over Current Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 12-short blink pattern
- Bit 11 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

L2 Over Current Warning Level

L2 Over Current Warning Level (Parameter 281) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a L2 Over Current warning. It is user-adjustable from 10...100% for the FLA Setting (Parameter 171).

Table 107 - L2 Over Current Warning Level (Parameter 281)

Default Value	90
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The L2 Over Current Warning function does not include a time delay feature. Once the Over Current Inhibit Timer has expired, the L2 Over Current Warning indication is instantaneous.

L3 Over Current Trip

The CEP9 Electronic Overload Relay will trip with a L3 Over Current indication if:

- No trip currently exists
- L3 Over Current Trip is enabled
- Current is present
- Over Current Inhibit Timer has expired
- L3 Percent FLA (Parameter 49) is greater than the L3 Over Current Trip Level for a time period greater than the L3 Over Current Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L3 Over Current, the:

- TRIP/WARN LED status indicator will flash a red 13-short blink pattern
- Bit 12 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L3 Over Current Trip Delay

L3 Over Current Trip Delay (Parameter 282) allows the installer to define the time period a L3 Over Current condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 108 - L3 Over Current Trip Delay (Parameter 282)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

L3 Over Current Trip Level

L3 Over Current Trip Level (Parameter 283) allows the installer to define the current at which the CEP9 Electronic Overload Relay will trip on a L3 Over Current. It is user-adjustable from 10...100% of the FLA Setting (Parameter 171).

Table 109 - L3 Over Current Trip Level (Parameter 283)

Default Value	100
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The Over Current Inhibit Timer starts after the maximum phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over current condition until the Over Current Inhibit Time expires.

L3 Over Current Warning

The CEP9 Electronic Overload Relay will indicate an L3 Over Current warning if:

- No warning currently exists
- L3 Over Current Warning is enabled
- Current is present
- The Over Current Inhibit Timer has expired

- L3 Percent FLA (Parameter 49) is greater than the L3 Over Current Warning Level

When the L2 Over Current Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 13-short blink pattern
- Bit 12 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

L3 Over Current Warning Level

L3 Over Current Warning Level (Parameter 284) allows the user to define the current at which the CEP9 Electronic Overload Relay will indicate a L3 Over Current warning. It is user-adjustable from 10...100% for the FLA Setting (Parameter 171).

Table 110 - L3 Over Current Warning Level (Parameter 284)

Default Value	90
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%FLA

IMPORTANT The L3 Over Current Warning function does not include a time delay feature. Once the Over Current Inhibit Timer has expired, the L3 Over Current Warning indication is instantaneous.

Line Loss Protection

For non-motor applications when the measured current is 0 amps a specific phase, this may indicate an electrical malfunction such as bad resistive heater element or non-operating incandescent light bulb. Such conditions may not harm the power system, but it can lead to loss of production or certification noncompliance.

The CEP9 Electronic Overload Relay can monitor for a current based line loss per phase with its Line Loss Trip and Warning function to detect for a rapid line loss in a specific phase to minimize damage and loss of production.

Line Loss Inhibit Time

Line Loss Inhibit Time (Parameter 285) allows the installer to inhibit an L1, L2, and L3 Line Loss trip and warning from occurring during a load starting sequence. It is adjustable from 0...250 seconds.

Table 111 - Line Loss Inhibit Time (Parameter 285)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

L1 Line Loss Trip

The CEP9 Electronic Overload Relay will trip with a L1 Line Loss indication if:

- No trip currently exists
- L1 Over Current Trip is enabled
- L1 Line Loss is activated via the appropriately programmed digital input (see Input Assignments, Parameters 196-201, in Chapter 3)
- Line Loss Inhibit Timer has expired
- L1 Percent FLA (Parameter 47) is
- equal to 0% for a time period greater than the L1 Line Loss Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L1 Line Loss, the:

- TRIP/WARN LED status indicator will flash a red 14-short blink pattern
- Bit 13 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L1 Line Loss Trip Delay

L1 Line Loss Trip Delay (Parameter 276) allows the installer to define the time period a L1 Line Loss condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 112 - L1 Line Loss Trip Delay (Parameter 286)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

IMPORTANT The Line Loss Inhibit Timer starts when L1, L2, or L3 Line Loss protection is activated by a programmed digital input (see Input Assignment Parameters 196-201). The CEP9 Electronic Overload Relay does not begin monitoring for Line Loss condition until the Line Loss Inhibit Timer expires.

L1 Line Loss Warning

The CEP9 Electronic Overload Relay will indicate an L1 Line Loss warning if:

- No warning currently exists

- L1 Line Loss Warning is enabled
- L1 Line Loss is activated via the appropriately programmed digital input (see Input Assignments, Parameters 196-201, in Chapter 3)
- Line Loss Inhibit Timer has expired
- L1 Percent FLA (Parameter 47) is equal to 0%

When the L1 Line Loss Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 14-short blink pattern
- Bit 13 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

IMPORTANT The L1 Line Loss Warning function does not include a time delay feature. Once the Line Loss Inhibit Timer has expired, the L1 Line Loss Warning indication is instantaneous.

L2 Line Loss Trip

The CEP9 Electronic Overload Relay will trip with a L2 Line Loss indication if:

- No trip currently exists
- L2 Over Current Trip is enabled
- L2 Line Loss is activated via the appropriately programmed digital input (see Input Assignments, Parameters 196-201, in Chapter 3)
- Line Loss Inhibit Timer has expired
- L2 Percent FLA (Parameter 48) is equal to 0% for a time period greater than the L2 Line Loss Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L2 Line Loss, the:

- TRIP/WARN LED status indicator will flash a red 15-short blink pattern
- Bit 14 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L2 Line Loss Trip Delay

L2 Line Loss Trip Delay (Parameter 287) allows the installer to define the time period a L2 Line Loss condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 113 - L2 Line Loss Trip Delay (Parameter 287)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

IMPORTANT The Line Loss Inhibit Timer starts when L1, L2, or L3 Line Loss protection is activated by a programmed digital input (see Input Assignment Parameters 196-201). The CEP9 Electronic Overload Relay does not begin monitoring for Line Loss condition until the Line Loss Inhibit Timer expires.

L2 Line Loss Warning

The CEP9 Electronic Overload Relay will indicate an L2 Line Loss warning if:

- No warning currently exists

- L2 Line Loss Warning is enabled
- L2 Line Loss is activated via the appropriately programmed digital input (see Input Assignments, Parameters 196-201, in Chapter 3)
- Line Loss Inhibit Timer has expired
- L2 Percent FLA (Parameter 48) is equal to 0%

When the L2 Line Loss Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 15-short blink pattern
- Bit 14 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

IMPORTANT The L2 Line Loss Warning function does not include a time delay feature. Once the Line Loss Inhibit Timer has expired, the L2 Line Loss Warning indication is instantaneous.

L3 Line Loss Trip

The CEP9 Electronic Overload Relay will trip with a L3 Line Loss indication if:

- No trip currently exists
- L3 Over Current Trip is enabled
- L3 Line Loss is activated via the appropriately programmed digital input (see Input Assignments, Parameters 196-201, in Chapter 3)
- Line Loss Inhibit Timer has expired
- L3 Percent FLA (Parameter 49) is equal to 0% for a time period greater than the L3 Line Loss Trip Delay.

If the CEP9 Electronic Overload Relay trips on a L3 Line Loss, the:

- TRIP/WARN LED status indicator will flash a red 16-short blink pattern
- Bit 15 in Current Trip Status (Parameter 4) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

L3 Line Loss Trip Delay

L3 Line Loss Trip Delay (Parameter 288) allows the installer to define the time period a L3 Line Loss condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 114 - L3 Line Loss Trip Delay (Parameter 288)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

IMPORTANT The Line Loss Inhibit Timer starts when L1, L2, or L3 Line Loss protection is activated by a programmed digital input (see Input Assignment Parameters 196-201). The CEP9 Electronic Overload Relay does not begin monitoring for Line Loss condition until the Line Loss Inhibit Timer expires.

L3 Line Loss Warning

The CEP9 Electronic Overload Relay will indicate an L3 Line Loss warning if:

- No warning currently exists

- L3 Line Loss Warning is enabled
- L3 Line Loss is activated via the appropriately programmed digital input (see Input Assignments, Parameters 196-201, in Chapter 3)
- Line Loss Inhibit Timer has expired
- L3 Percent FLA (Parameter 49) is equal to 0%

When the L3 Line Loss Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 16-short blink pattern
- Bit 15 in Current Warning Status (Parameter 10) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

IMPORTANT The L3 Line Loss Warning function does not include a time delay feature. Once the Line Loss Inhibit Timer has expired, the L3 Line Loss Warning indication is instantaneous.

Voltage Based Protection

The CEP9 Electronic Overload Relay has the option to digitally monitor the voltage supplied to an electric motor to protect against poor voltage quality. The user can prevent a contactor from energizing if the voltage is either too high, too low, or wrong rotation. The following CEP9 Sensing Modules provide voltage monitoring capabilities.

Table 115 - Voltage Capabilities

Catalog Number	Measurement Method	L-L Voltage Trip/Warning Range
CEP9-ESM-VIG-__-__	Internal	20…800V
CEP9-ESM-VIG-CT-30	External	20…6500V

This voltage information is used for the following protective trip and warning functions:

- Under Voltage Trip/Warning
- Over Voltage Trip/Warning
- Voltage Imbalance Trip/Warning
- Phase Rotation Mismatch Trip
- Under Frequency Trip/Warning
- Over Frequency Trip/Warning

Voltage Trip Enable (Parameter 184) and Voltage Warning Enable (Parameter 190) are used to enable the respective voltage based protective trip and warning functions.

Table 116 - Voltage Trip Enabled (Parameter 184)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Trip
														X		Over Voltage Trip
													X			Voltage Imbalance Trip
												X				Phase Rotation Mismatch Trip
											X					Under Frequency Trip
										X						Over Frequency Trip
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Table 117 - Voltage Warning Enable (Parameter 190)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Warning
														X		Over Voltage Warning
													X			Voltage Imbalance Warning
												X				Phase Rotation Mismatch Warning
											X					Under Frequency Warning
										X						Over Frequency Warning
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Voltage Trip Status (Parameter 5) and Voltage Warning Status (Parameter 11) are used to view the status of the respective voltage based protective trip and warning functions.

Table 118 - Voltage Trip Status (Parameter 5)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Trip
														X		Over Voltage Trip
													X			Voltage Imbalance Trip
												X				Phase Rotation Mismatch Trip
											X					Under Frequency Trip
										X						Over Frequency Trip
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Table 119 - Voltage Warning Status (Parameter 11)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Warning
														X		Over Voltage Warning
													X			Voltage Imbalance Warning
												X				Phase Rotation Mismatch Warning
											X					Under Frequency Warning
										X						Over Frequency Warning
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Under Voltage Protection

Electric motors will consume more electric current when the voltage supplied to the motor is lower than the motor name plate rating. This could cause damage to an electric motor over an extended period of time. The CEP9 Electronic Overload Relay can monitor for this condition with its Under Voltage Trip and Warning function to detect for low voltage levels to minimize motor damage and loss of production.

Under Voltage Inhibit Time

Under Voltage Inhibit Time (Parameter 355) allows the installer to inhibit an under voltage trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 120 - Under Voltage Inhibit Time (Parameter 355)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under Voltage Trip

The CEP9 Electronic Overload Relay will trip with an Under Voltage indication if:

- No trip currently exists
- Under Voltage Trip is enabled
- Voltage is present
- Under Voltage Inhibit Time has expired
- The minimum phase voltage is less than the Under Voltage Trip Level for a time period greater than the Under Voltage Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under voltage, the:

- TRIP/WARN LED status indicator will flash a red 1-long / 1-short blink pattern
- Bit 0 in Voltage Trip Status (Parameter 5) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under Voltage Trip Delay

Under Voltage Trip Delay (Parameter 356) allows the installer to define the time period an under voltage condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 121 - Under Voltage Trip Delay (Parameter 356)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under Voltage Trip Level

Under Voltage Trip Level (Parameter 357) allows the installer to define the voltage at which the CEP9 Electronic Overload Relay will trip on an under voltage. It is user-adjustable from 0...6553.5 volts.

Table 122 - Under Voltage Trip Level (Parameter 357)

Default Value	100.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

IMPORTANT The Under Voltage Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The CEP9 Electronic Overload Relay does not begin monitoring for an under voltage condition until the Under Voltage Inhibit Time expires.

Under Voltage Warning

The CEP9 Electronic Overload Relay will indicate an Under Voltage warning if:

- No warning currently exists
- Under Voltage Warning is enabled
- Voltage is present
- Under Voltage
- Inhibit Time has expired
- The minimum phase voltage is equal to or less than the Under Voltage Warning Level

When the Under Voltage Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 1-long / 1-short blink pattern
- Bit 0 in Voltage Warning Status (Parameter 11) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under Voltage Warn Level

Under Voltage Warn Level (Parameter 358) allows the user to define the voltage at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...6553.5 volts.

Table 123 - Under Voltage Warn Level

Default Value	400.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

IMPORTANT The Under Voltage Warning function does not include a time delay feature. Once the Under Voltage Inhibit Time has expired, the Under Voltage Warning indication is instantaneous.

Over Voltage Protection

The winding insulation for electric motors will degrade faster when more voltage is supplied to the motor than the motor name plate rating. This could cause damage to an electric motor over an extended period of time. The CEP9 Electronic Overload Relay can monitor for this condition with its Over Voltage Trip and Warning function to detect for high voltage levels to minimize motor damage and loss of production.

Over Voltage Inhibit Time

Over Voltage Inhibit Time (Parameter 359) allows the installer to inhibit an over voltage trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Default Value	10.0
Minimum Value	0.0
Maximum Value	250.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	11
Units	Sec

Over Voltage Trip

The CEP9 Electronic Overload Relay will trip with an Over Voltage indication if:

- No trip currently exists
- Over Voltage Trip is enabled
- Voltage is present
- Over Voltage Inhibit Time has expired
- The minimum phase voltage is greater than the Over Voltage Trip Level for a time period greater than the Over Voltage Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over voltage, the:

- TRIP/WARN LED status indicator will flash a red 1-long / 2-short blink pattern
- Bit 1 in Voltage Trip Status (Parameter 5) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open

- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over Voltage Trip Delay

Over Voltage Trip Delay (Parameter 360) allows the installer to define the time period an over voltage condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 124 - Over Voltage Trip Delay (Parameter 360)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over Voltage Trip Level

Over Voltage Trip Level (Parameter 357) allows the installer to define the voltage at which the CEP9 Electronic Overload Relay will trip on an over voltage. It is user-adjustable from 0...6553.5 volts.

Table 125 - Over Voltage Trip Level (Parameter 361)

Default Value	500.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

IMPORTANT The Over Voltage Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The CEP9 Electronic Overload Relay does not begin monitoring for an over voltage condition until the Over Voltage Inhibit Time expires.

Over Voltage Warning

The CEP9 Electronic Overload Relay will indicate an Over Voltage warning if:

- No warning currently exists
- Over Voltage Warning is enabled
- Voltage is present
- Over Voltage Inhibit Time has expired
- The maximum phase voltage is equal to or greater than the Over Voltage Warning Level

When the Over Voltage Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 1-long / 2-short blink pattern
- Bit 1 in Voltage Warning Status (Parameter 11) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over Voltage Warn Level

Over Voltage Warn Level (Parameter 362) allows the user to define the voltage at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...6553.5 volts.

Table 126 - Over Voltage Warn Level (Parameter 362)

Default Value	490.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

IMPORTANT The Over Voltage Warning function does not include a time delay feature. Once the Over Voltage Inhibit Time has expired, the Over Voltage Warning indication is instantaneous.

Voltage Imbalance Protection

A voltage imbalance can be caused by poor power quality and unequal distribution of power. When a voltage imbalance exists, the motor can experience an additional temperature rise, resulting in degradation of the motor insulation and reduction of life expectancy. The CEP9 Electronic Overload Relay can monitor for this condition with its Voltage Imbalance Trip and Warning function to detect for a rapid voltage imbalance fault to minimize damage and loss of production.

Voltage Imbalance can be defined by the following equation:

$$\%V_{Imb} = 100\% * (V_d/V_a)$$

where

$\%V_{Imb}$ = Percent Voltage Imbalance

V_d = Maximum Deviation from the Average Voltage

V_a = Average Voltage

Voltage Imbalance Inhibit Time

Voltage Imbalance Inhibit Time (Parameter 365) allows the installer to inhibit a voltage imbalance trip from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 127 - Voltage Imbalance Inhibit Time (Parameter 365)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Voltage Imbalance Trip

The CEP9 Electronic Overload Relay will trip with a voltage imbalance indication if:

- No trip currently exists
- Voltage Imbalance Trip is enabled
- Voltage is present
- Voltage Imbalance Inhibit Time has expired
- The Voltage Imbalance (Parameter 61) is greater than the Voltage Imbalance Trip Level for a time period greater than the Voltage Imbalance Trip Delay.

If the CEP9 Electronic Overload Relay trips on a voltage imbalance, the:

- TRIP/WARN LED status indicator will flash a red 1-long / 3-short blink pattern
- Bit 2 in Voltage Trip Status (Parameter 5) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Voltage Imbalance Trip Delay

Voltage Imbalance Trip Delay (Parameter 366) allows the installer to define the time period a voltage imbalance condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 128 - Voltage Imbalance Trip Delay (Parameter 366)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Voltage Imbalance Trip Level

Voltage Imbalance Trip Level (Parameter 367) allows the installer to define the percentage at which the CEP9 Electronic Overload Relay will trip on a voltage imbalance. It is user-adjustable from 10...100%.

Table 129 - Voltage Imbalance Trip Level (Parameter 367)

Default Value	15
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Voltage Imbalance Inhibit Timer starts after a phase voltage transitions from 0V to 20V L-L. The CEP9 Electronic Overload Relay does not begin monitoring for a voltage imbalance condition until the Voltage Imbalance Inhibit Time expires.

Voltage Imbalance Warning

The CEP9 Electronic Overload Relay will indicate a voltage imbalance warning if:

- No warning currently exists
- Voltage Imbalance Warning is enabled
- Voltage is present
- Voltage Imbalance Inhibit Time has expired
- The Voltage Imbalance (Parameter 61) is greater than the Voltage Imbalance Warning Level

When the Voltage Imbalance Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow red 1-long / 3-short blink pattern
- Bit 2 in Voltage Warning Status (Parameter 11) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1

- Any relay outputs configured as a Warning Alarm will close

Voltage Imbalance Warning Level

Voltage Imbalance Warning Level (Parameter 368) allows the user to define the percentage at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 10...100%.

Table 130 - Voltage Imbalance Warning Level (Parameter 368)

Default Value	10
Minimum Value	10
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Voltage Imbalance Warning function does not include a time delay feature. Once the Voltage Imbalance Inhibit Time has expired, the Voltage Imbalance Warning indication is instantaneous.

Phase Rotation Protection

Wiring of a three-phase voltage system can affect the rotational direction of an electric motor. The CEP9 Electronic Overload Relay can protect against the improper phase rotation so that an electric motor rotates in the proper direction, ABC or ACB, to prevent equipment from being damaged.

Phase Rotation Inhibit Time

Phase Rotation Inhibit Time (Parameter 359) allows the installer to inhibit a phase rotation mismatch trip and warning from occurring. It is adjustable from 0...250 seconds.

Table 131 - Phase Rotation Inhibit Time (Parameter 363)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Phase Rotation Trip

The CEP9 Electronic Overload Relay will trip with a Phase Rotation indication if:

- No trip currently exists
- Phase Rotation Trip is enabled
- Voltage is present
- Phase Rotation Inhibit Time has expired
- The measured Voltage Phase Rotation (Parameter 63) does not match the
- required Phase Rotation Type (Parameter 364).

If the CEP9 Electronic Overload Relay trips on a phase rotation mismatch, the:

- TRIP/WARN LED status indicator will flash a red 1-long / 4-short blink pattern
- Bit 3 in Voltage Trip Status (Parameter 5) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Phase Rotation Trip Type

Phase Rotation Trip Type (Parameter 364) allows the installer to define the required voltage phase rotation for the motor application. CEP9 Electronic

Overload Relay will trip on a phase rotation mismatch when this parameter does not match the measured voltage phase rotation. It is user-adjustable, ABC or ACB.

Table 132 - Phase Rotation Trip Type (Parameter 364)

Default Value	1 = ABC
Range	1 = ABC 2 = ACB
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

IMPORTANT The Phase Rotation Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The CEP9 Electronic Overload Relay does not begin monitoring for a phase rotation mismatch condition until the Phase Rotation Inhibit Time expires.

Frequency Protection

The CEP9 Electronic Overload Relay has the capability to protect against poor voltage quality by offering frequency based protection. This protection is used when electric power is provided by stand-alone electric generators. The user can prevent a contactor from energizing if the voltage frequency is either too high or too low. The CEP9 Electronic Overload Relay can monitor for this condition with its Over and Under Frequency Trip and Warning function, and it can detect for an improper voltage frequency to minimize motor damage and loss of production.

Under Frequency Inhibit Time

Under Frequency Inhibit Time (Parameter 369) allows the installer to inhibit an under frequency trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 133 - Under Frequency Inhibit Time (Parameter 369)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Over Frequency Inhibit Time

Over Frequency Inhibit Time (Parameter 373) allows the installer to inhibit an over frequency trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 134 - Over Frequency Inhibit Time (Parameter 373)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under Frequency Trip

The CEP9 Electronic Overload Relay will trip with an Under Frequency indication if:

- No trip currently exists
- Under Frequency Trip is enabled
- Voltage is present
- Under Frequency Inhibit Time has expired
- The voltage frequency is less than the Under Frequency Trip Level for a time period greater than the Under Frequency Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under frequency, the:

- TRIP/WARN LED status indicator will flash a red 1-long / 5-short blink pattern
- Bit 4 in Voltage Trip Status (Parameter 5) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under Frequency Trip Delay

Under Frequency Trip Delay (Parameter 370) allows the installer to define the time period an under frequency condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 135 - Under Frequency Trip Delay (Parameter 370)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under Frequency Trip Level

Under Voltage Trip Level (Parameter 371) allows the installer to define the frequency at which the CEP9 Electronic Overload Relay will trip on an under frequency. It is user-adjustable from 46...65 Hz.

Table 136 - Under Frequency Trip Level (Parameter 371)

Default Value	57
Minimum Value	46
Maximum Value	65
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Hz

IMPORTANT The Under Frequency Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The CEP9 Electronic Overload Relay does not begin monitoring for an under frequency condition until the Under Frequency Inhibit Time expires.

Under Frequency Warning

The CEP9 Electronic Overload Relay will indicate an Under Frequency warning if:

- No warning currently exists
- Under Frequency Warning is enabled
- Voltage is present
- Under Frequency Inhibit Time has expired
- The voltage frequency is equal to or less than the Under Frequency Warning Level

When the Under Frequency Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 1-long / 5-short blink pattern
- Bit 4 in Voltage Warning Status (Parameter 11) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under Frequency Warn Level

- Under Frequency Warn Level (Parameter 372) allows the user to define the frequency at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 46...65 Hz.

Table 137 - Under Frequency Warn Level (Parameter 372)

Default Value	58
Minimum Value	46
Maximum Value	65
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Hz

Over Frequency Trip

The CEP9 Electronic Overload Relay will trip with an Over Frequency indication if:

- No trip currently exists
- Over Frequency Trip is enabled
- Voltage is present
- Over Frequency Inhibit Time has expired
- The voltage frequency is greater than the Over Frequency Trip Level for a time period greater than the Over Frequency Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over frequency, the:

- TRIP/WARN LED status indicator will flash a red 1-long / 6-short blink pattern
- Bit 5 in Voltage Trip Status (Parameter 5) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over Frequency Trip Delay

Over Frequency Trip Delay (Parameter 374) allows the installer to define the time period an over frequency condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 138 - Over Frequency Trip Delay (Parameter 374)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over Frequency Trip Level

Over Voltage Trip Level (Parameter 375) allows the installer to define the frequency at which the CEP9 Electronic Overload Relay will trip on an over frequency. It is user-adjustable from 46...65 Hz.

Table 139 - Over Frequency Trip Level (Parameter 375)

Default Value	63
Minimum Value	46
Maximum Value	65
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Hz

IMPORTANT The Over Frequency Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L. The CEP9 Electronic Overload Relay does not begin monitoring for an over frequency condition until the Over Frequency Inhibit Time expires.

Over Frequency Warning

The CEP9 Electronic Overload Relay will indicate an Over Frequency warning if:

- No warning currently exists
- Over Frequency Warning is enabled
- Voltage is present
- Over Frequency Inhibit Time has expired
- The voltage frequency is equal to or greater than the Over Frequency Warning Level

When the Over Frequency Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 1-long / 6-short blink pattern
- Bit 5 in Voltage Warning Status (Parameter 11) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over Frequency Warn Level

Over Frequency Warn Level (Parameter 376) allows the user to define the frequency at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 46...65 Hz.

Table 140 - Over Frequency Warn Level (Parameter 376)

Default Value	62
Minimum Value	46
Maximum Value	65
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Hz

IMPORTANT The Over Frequency Warning function does not include a time delay feature. Once the Over Frequency Inhibit Time has expired, the Over Frequency Warning indication is instantaneous.

Power Based Protection

The CEP9 Electronic Overload Relay has the option to digitally monitor the power supplied to an electric motor to protect against poor power quality or alert users when power consumed by the motor is different from what is expected. This protection is useful for pump cavitation and pump material change detection. The following CEP9 Sensing Modules provide power monitoring capabilities.

Table 141 - Power Capabilities

Catalog Number	Measurement Method	L-L Voltage Trip Range
CEP9-ESM-VIG-__-__	Internal	20-800V
CEP9-ESM-VIG-CT-30	External	20-6500V

This power information is used for the following protective trip and warning functions:

- Under Real Power (kW) Trip/Warning
- Over Real Power (kW) Trip/Warning
- Under Reactive Power (kVAR) Trip/Warning
- Over Real Power (kVAR) Trip/Warning

- Under Reactive Power (kVA) Trip/Warning
- Over Real Power (kVA) Trip/Warning
- Under Power Factor Trip/Warning
- Over Power Factor Trip/Warning

Power Trip Enable (Parameter 185) and Power Warning Enable (Parameter 191) are used to enable the respective power based protective trip and warning functions.

Table 142 - Power Trip Enable (Parameter 185)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Trip
														X		Over kW Trip
													X			Under kVAR Consumed Trip
												X				Over kVAR Consumed Trip
											X					Under kVAR Generated Trip
										X						Over kVAR Generated Trip
									X							Under kVA Trip
								X								Over kVA Trip
							X									Under PF Lagging Trip
						X										Over PF Lagging Trip
					X											Under PF Leading Trip
				X												Over PF Leading Trip
																Reserved
																Reserved
																Reserved
																Reserved

Table 143 - Power Warning Enable (Parameter 191)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Warning
														X		Over kW Warning
													X			Under kVAR Consumed Warning
												X				Over kVAR Consumed Warning
											X					Under kVAR Generated Warning
										X						Over kVAR Generated Warning
									X							Under kVA Warning
								X								Over kVA Warning
							X									Under PF Lagging Warning
						X										Over PF Lagging Warning
					X											Under PF Leading Warning
				X												Over PF Leading Warning
																Reserved
																Reserved
																Reserved
																Reserved

Power Trip Status (Parameter 6) and Power Warning Status (Parameter 12) are used to view the status of the respective power based protective trip and warning functions.

Table 144 - Power Trip Status (Parameter 6)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Trip
														X		Over kW Trip
													X			Under kVAR Consumed Trip
												X				Over kVAR Consumed Trip
											X					Under kVAR Generated Trip
										X						Over kVAR Generated Trip
									X							Under kVA Trip
								X								Over kVA Trip
							X									Under PF Lagging Trip
						X										Over PF Lagging Trip
					X											Under PF Leading Trip
				X												Over PF Leading Trip
																Reserved
																Reserved
																Reserved
																Reserved

Table 145 - Power Warning Status (Parameter 12)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Warning
														X		Over kW Warning
													X			Under kVAR Consumed Warning
												X				Over kVAR Consumed Warning
											X					Under kVAR Generated Warning
										X						Over kVAR Generated Warning
									X							Under kVA Warning
								X								Over kVA Warning
							X									Under PF Lagging Warning
						X										Over PF Lagging Warning
					X											Under PF Leading Warning
				X												Over PF Leading Warning
																Reserved
																Reserved
																Reserved
																Reserved

Real Power (kW) Protection

The CEP9 Electronic Overload Relay has the capability to protect against real power (kW) for specific applications that require the monitoring of both voltage and current. The user can protect or issue a warning in the event that the real power (kW) consumption of an electric motor is either too high or too low.

Under kW Inhibit Time

Under kW Inhibit Time (Parameter 378) allows the installer to inhibit an under real power (kW) trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 146 - Under kW Inhibit Time (Parameter 378)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Over kW Inhibit Time

Over kW Inhibit Time (Parameter 382) allows the installer to inhibit an over real power (kW) trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 147 - Over kW Inhibit Time (Parameter 382)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under kW Trip

The CEP9 Electronic Overload Relay will trip with an Under kW indication if:

- No trip currently exists
- Under kW Trip is enabled
- Current is present
- Voltage is present
- Under kW Inhibit Time has expired
- The total real power (kW) is less than the Under kW Trip Level for a time period greater than the Under kW Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under real power (kW), the:

- TRIP/WARN LED status indicator will flash a red 2-long / 1-short blink pattern
- Bit 0 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under kW Trip Delay

Under kW Trip Delay (Parameter 379) allows the installer to define the time period an under real power (kW) condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 148 - Under kW Trip Delay (Parameter 379)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under kW Trip Level

Under kW Trip Level (Parameter 380) allows the installer to define the real power (kW) at which the CEP9 Electronic Overload Relay will trip on an under real power (kW). It is user-adjustable from 0...2,000,000 kW.

Table 149 - UnderkW Trip Level (Parameter 380)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2,000,000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW

IMPORTANT The Under kW Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under real power (kW) condition until the Under kW Inhibit Time expires.

Under kW Warning

The CEP9 Electronic Overload Relay will indicate an Under kW warning if:

- No warning currently exists
- Under kW Warning is enabled
- Current is present
- Voltage is present
- Under kW Inhibit Time has expired
- The total real power (kW) is equal to or less than the Under kW Warning Level

When the Under kW Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 1-short blink pattern
- Bit 0 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under kW Warn Level

Under kW Warn Level (Parameter 381) allows the user to define the real power (kW) at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 150 - Under kW Warn Level (Parameter 381)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW

IMPORTANT The Under kW Warning function does not include a time delay feature. Once the Under kW Inhibit Time has expired, the Under kW Warning indication is instantaneous.

Over kW Trip

The CEP9 Electronic Overload Relay will trip with an Over kW indication if:

- No trip currently exists
- Over kW Trip is enabled
- Current is present
- Voltage is present
- Over kW Inhibit Time has expired
- The total real power (kW) is greater than the Over kW Trip Level for a time period greater than the Over kW Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over real power (kW), the:

- TRIP/WARN LED status indicator will flash a red 2-long / 2-short blink pattern
- Bit 1 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over kW Trip Delay

Over kW Trip Delay (Parameter 383) allows the installer to define the time period an over real power (kW) condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 151 - Over kW Trip Delay

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over kW Trip Level

Over kW Trip Level (Parameter 384) allows the installer to define the total real power (kW) at which the CEP9 Electronic Overload Relay will trip on over real power (kW). It is user-adjustable from 0...2,000,000 kW.

Table 152 - Over kW Trip Level (Parameter 384)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW

IMPORTANT The Over kW Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over real power (kW) condition until the Over kW Inhibit Time expires.

Over kW Warning

The CEP9 Electronic Overload Relay will indicate an Over kW warning if:

- No warning currently exists
- Over kW Warning is enabled
- Current is present
- Voltage is present
- Over kW Inhibit Time has expired
- The total real power (kW) is equal to or greater than the Over kW Warning Level

When the Over kW Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 2-short blink pattern
- Bit 1 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over kW Warn Level

Over kW Warn Level (Parameter 385) allows the user to define the real power (kW) at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 153 - Over kW Warn Level

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW

IMPORTANT The Over kW Warning function does not include a time delay feature. Once the Over kW Inhibit Time has expired, the Over kW Warning indication is instantaneous.

Reactive Power (kVAR) Protection

The CEP9 Electronic Overload Relay has the capability to protect against reactive power (kVAR) for specific applications that require the monitoring of both voltage and current. The user can protect or issue a warning in the event that the reactive power (kVAR) of an electric motor is either too high or too low.

Under kVAR Consumed Inhibit Time

Under kVAR Consumed Inhibit Time (Parameter 386) allows the installer to inhibit an under reactive power (kVAR) consumed trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 154 - Under kVAR Consumed Inhibit Time (Parameter 386)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Over kVAR Consumed Inhibit Time

Over kVAR Consumed Inhibit Time (Parameter 390) allows the installer to inhibit an over reactive power (kVAR) consumed trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 155 - Over kVAR Consumed Inhibit Time (Parameter 390)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under kVAR Generated Inhibit Time

Under kVAR Generated Inhibit Time (Parameter 394) allows the installer to inhibit an under power factor leading trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 156 - Under kVAR Generated Inhibit Time (Parameter 394)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Over kVAR Generated Inhibit Time

Over kVAR Generated Inhibit Time (Parameter 398) allows the installer to inhibit an over reactive power (kVAR) generated trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 157 - Over kVAR Generated Inhibit Time (Parameter 398)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under kVAR Consumed Trip

The CEP9 Electronic Overload Relay will trip with an Under kVAR Consumed indication if:

- No trip currently exists
- Under kVAR Consumed Trip is enabled
- Current is present
- Voltage is present
- Under kVAR Consumed Inhibit Time has expired
- The total reactive power (kVAR) consumed is less than the Under kVAR Consumed Trip Level for a time period greater than the Under kVAR Consumed Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under reactive power (kVAR) consumed, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 3-short blink pattern
- Bit 2 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under kVAR Consumed Trip Delay

Under kVAR Consumed Trip Delay (Parameter 387) allows the installer to define the time period an under reactive power (kVAR) consumed condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 158 - Under kVAR Consumed Trip Delay (Parameter 387)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under kVAR Consumed Trip Level

Under kVAR Consumed Trip Level (Parameter 388) allows the installer to define the reactive power (kVAR) consumed at which the CEP9 Electronic Overload Relay will trip on an under reactive power (kVAR) consumed. It is user-adjustable from 0...2,000,000 kW.

Table 159 - Under kVAR Consumed Trip Level (Parameter 388)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Under kVAR Consumed Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under reactive power (kVAR) consumed condition until the Under kVAR Consumed Inhibit Time expires.

Under kVAR Consumed Warning

The CEP9 Electronic Overload Relay will indicate an Under kVAR Consumed warning if:

- No warning currently exists
- Under kVAR Consumed Warning is enabled
- Current is present
- Voltage is present
- Under kVAR Consumed Inhibit Time has expired
- The total reactive power (kVAR) consumed is equal to or less than the Under kVAR Consumed Warning Level

When the Under kVAR Consumed Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 3-short blink pattern
- Bit 2 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under kVAR Consumed Warn Level

Under kVAR Consumed Warn Level (Parameter 389) allows the user to define the reactive power (kVAR) consumed at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 160 - Under kVAR Consumed Warn Level (Parameter 389)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Under kVAR Consumed Warning function does not include a time delay feature. Once the Under kVAR consumed Inhibit Time has expired, the Under kVAR Consumed Warning indication is instantaneous.

Over kVAR ConsumedTrip

The CEP9 Electronic Overload Relay will trip with an Over kVAR Consumed indication if:

- No trip currently exists
- Over kVAR Consumed Trip is enabled
- Current is present
- Voltage is present
- Over kVAR Consumed Inhibit Time has expired
- The total reactive power (kVAR) consumed is greater than the Over kVAR Consumed Trip Level for a time period greater than the Over kVAR Consumed Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over reactive power (kVAR) consumed, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 4-short blink pattern
- Bit 3 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over kVAR Consumed Trip Delay

Over kVAR Consumed Trip Delay (Parameter 399) allows the installer to define the time period an over reactive power (kVAR) consumed condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 161 - Over kVAR Consumed Trip Delay (Parameter 391)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over kVAR Consumed Trip Level

Over kVAR Consumed Trip Level (Parameter 392) allows the installer to define the total reactive power (kVAR) consumed at which the CEP9 Electronic Overload Relay will trip on over reactive power (kVAR) consumed. It is user-adjustable from 0...2,000,000 kW.

Table 162 - Over kVAR Consumed Trip Level (Parameter 392)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Over kVAR Consumed Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over reactive power (kVAR) consumed condition until the Over kVAR Consumed Inhibit Time expires.

Over kVAR Consumed Warning

The CEP9 Electronic Overload Relay will indicate an Over kVAR warning if:

- No warning currently exists
- Over kVAR Consumed Warning is enabled
- Current is present
- Voltage is present
- Over kVAR Consumed Inhibit Time has expired
- The total reactive power (kVAR) consumed is equal to or greater than the Over kVAR Consumed Warning Level

When the Over kVAR Consumed Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 4-short blink pattern
- Bit 3 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over kVAR Consumed Warn Level

Over kVAR Consumed Warn Level (Parameter 393) allows the user to define the reactive power (kVAR) consumed at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 163 - Over kVAR Consumed Warn Level (Parameter 393)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Over kVAR Consumed Warning function does not include a time delay feature. Once the Over kVAR Consumed Inhibit Time has expired, the Over kVAR Consumed Warning indication is instantaneous.

Under kVAR Generated Trip

The CEP9 Electronic Overload Relay will trip with an Under kVAR Generated indication if:

- No trip currently exists
- Under kVAR Generated Trip is enabled
- Current is present
- Voltage is present
- Under kVAR Generated Inhibit Time has expired
- The total reactive power (kVAR) generated is less than the Under
- kVAR Generated Trip Level for a time period greater than the Under kVAR Generated Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under reactive power (kVAR) generated, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 5-short blink pattern
- Bit 4 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under kVAR Generated Trip Delay

Under kVAR Generated Trip Delay (Parameter 395) allows the installer to define the time period an under reactive power (kVAR) generated condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 164 - Under kVAR Generated Trip Delay (Parameter 395)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under kVAR Generated Trip Level

Under kVAR Generated Trip Level (Parameter 396) allows the installer to define the reactive power (kVAR) generated at which the CEP9 Electronic Overload Relay will trip on an under reactive power (kVAR) generated. It is user-adjustable from 0...2,000,000 kW.

Table 165 - Under kVAR Generated Trip Level (Parameter 396)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Under kVAR Generated Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under reactive power (kVAR) generated condition until the Under kVAR Generated Inhibit Time expires.

Under kVAR Generated Warning

The CEP9 Electronic Overload Relay will indicate an Under kVAR Generated warning if:

- No warning currently exists
- Under kVAR Generated Warning is enabled
- Current is present
- Voltage is present
- Under kVAR Generated Inhibit Time has expired
- The total reactive power (kVAR) generated is equal to or less than the Under kVAR Generated Warning Level

When the Under kVAR Generated Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 5-short blink pattern
- Bit 4 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under kVAR Generated Warn Level

Under kVAR Generated Warn Level (Parameter 397) allows the user to define the reactive power (kVAR) generated at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 166 - Under kVAR Generated Warn Level (Parameter 397)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Under kVAR Generated Warning function does not include a time delay feature. Once the Under kVAR generated Inhibit Time has expired, the Under kVAR Generated Warning indication is instantaneous.

Over kVAR Generated Trip

The CEP9 Electronic Overload Relay will trip with an Over kVAR Generated indication if:

- No trip currently exists
- Over kVAR Generated Trip is enabled
- Current is present
- Voltage is present
- Over kVAR Generated Inhibit Time has expired
- The total reactive power (kVAR) generated is greater than the Over
- kVAR Generated Trip Level for a time period greater than the Over kVAR Generated Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over reactive power (kVAR) generated, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 6-short blink pattern
- Bit 5 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over kVAR Generated Trip Delay

Over kVAR Generated Trip Delay (Parameter 399) allows the installer to define the time period an over reactive power (kVAR) generated condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 167 - Over kVAR Generated Trip Display (Parameter 399)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over kVAR Generated Trip Level

Over kVAR Generated Trip Level (Parameter 400) allows the installer to define the total reactive power (kVAR) generated at which the CEP9 Electronic Overload Relay will trip on over reactive power (kVAR) generated. It is user-adjustable from 0...2,000,000 kW.

Table 168 - Over kVAR Generated Trip Level (Parameter 400)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Over kVAR Generated Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over reactive power (kVAR) generated condition until the Over kVAR Generated Inhibit Time expires.

Over kVAR Generated Warning

The CEP9 Electronic Overload Relay will indicate an Over kVAR warning if:

- No warning currently exists
- Over kVAR Generated Warning is enabled
- Current is present
- Voltage is present
- Over kVAR Generated Inhibit Time has expired
- The total reactive power (kVAR) generated is equal to or greater than the Over kVAR Generated Warning Level

When the Over kVAR Generated Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 6-short blink pattern
- Bit 5 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over kVAR Generated Warn Level

Over kVAR Generated Warn Level (Parameter 401) allows the user to define the reactive power (kVAR) generated at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 169 - Over kVAR Generated Warn Level (Parameter 401)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

IMPORTANT The Over kVAR Generated Warning function does not include a time delay feature. Once the Over kVAR Generated Inhibit Time has expired, the Over kVAR Generated Warning indication is instantaneous.

Apparent Power (kVA) Protection

The CEP9 Electronic Overload Relay has the capability to protect against apparent power (kVA) for specific applications that require the monitoring of both voltage and current. The user can protect or issue a warning in the event that the apparent power (kVA) consumption of an electric motor is either too high or too low.

Under kVA Inhibit Time

Under kVA Inhibit Time (Parameter 402) allows the installer to inhibit an under apparent power (kVA) trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 170 - Under kVA Inhibit Time (Parameter 402)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Over kVA Inhibit Time

Over kVA Inhibit Time (Parameter 406) allows the installer to inhibit an over apparent power (kVA) trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 171 - Over kVA Inhibit Time (Parameter 406)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under kVA Trip

The CEP9 Electronic Overload Relay will trip with an Under kVA indication if:

- No trip currently exists
- Under kVA Trip is enabled
- Current is present
- Voltage is present
- Under kVA Inhibit Time has expired
- The total apparent power (kVA) is less than the Under kVA Trip Level for a time period greater than the Under kVA Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under apparent power (kVA), the:

- TRIP/WARN LED status indicator will flash a red 2-long / 7-short blink pattern
- Bit 6 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under kVA Trip Delay

Under kVA Trip Delay (Parameter 403) allows the installer to define the time period an under apparent power (kVA) condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 172 - Under kVA Trip Delay (Parameter 403)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under kVA Trip Level

Under kVA Trip Level (Parameter 404) allows the installer to define the apparent power (kVA) at which the CEP9 Electronic Overload Relay will trip on an under apparent power (kVA). It is user-adjustable from 0...2,000,000 kVA.

Table 173 - Under kVA Trip Level (Parameter 404)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2,000,000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA

IMPORTANT The Under kVA Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under apparent power (kVA) condition until the Under kVA Inhibit Time expires.

Under kVA Warning

The CEP9 Electronic Overload Relay will indicate an Under kVA warning if:

- No warning currently exists
- Under kVA Warning is enabled
- Current is present
- Voltage is present
- Under kVA Inhibit Time has expired
- The total apparent power (kVA) is equal to or less than the Under kVA Warning Level

When the Under kVA Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 7-short blink pattern
- Bit 6 in Power Warning Status (Parameter 12) will set to 1

- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under kVA Warn Level

Under kVA Warn Level (Parameter 405) allows the user to define the apparent power (kVA) at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kVA.

Table 174 - Under kVA Warn Level (Parameter 405)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2,000,000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA

IMPORTANT The Under kVA Warning function does not include a time delay feature. Once the Under kVA Inhibit Time has expired, the Under kVA Warning indication is instantaneous.

Over kVA Trip

The CEP9 Electronic Overload Relay will trip with an Over kVA indication if:

- No trip currently exists
- Over kVA Trip is enabled
- Current is present
- Voltage is present
- Over kVA Inhibit Time has expired
- The total apparent power (kVA) is greater than the Over kVA Trip Level for a time period greater than the Over kVA Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over apparent power (kVA), the:

- TRIP/WARN LED status indicator will flash a red 2-long / 8-short blink pattern
- Bit 7 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over kVA Trip Delay

Over kVA Trip Delay (Parameter 407) allows the installer to define the time period an over apparent power (kVA) condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 175 - Over kVA Trip Delay (Parameter 407)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over kVA Trip Level

Over kVA Trip Level (Parameter 408) allows the installer to define the total apparent power (kVA) at which the CEP9 Electronic Overload Relay will trip on over apparent power (kVA). It is user-adjustable from 0...2,000,000 kVA.

Table 176 - Over kVA Trip Level (Parameter 408)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2,000,000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA

IMPORTANT The Over kVA Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over apparent power (kVA) condition until the Over kVA Inhibit Time expires.

Over kVA Warning

The CEP9 Electronic Overload Relay will indicate an Over kVA warning if:

- No warning currently exists
- Over kVA Warning is enabled
- Current is present
- Voltage is present
- Over kVA Inhibit Time has expired
- The total apparent power (kVA) is equal to or greater than the Over kVA Warning Level

When the Over kVA Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 8-short blink pattern
- Bit 7 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over kVA Warn Level

Over kVA Warn Level (Parameter 409) allows the user to define the apparent power (kVA) at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kVA.

Table 177 - Over kVA Warn Level (Parameter 409)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2,000,000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA

IMPORTANT The Over kVA Warning function does not include a time delay feature. Once the Over kVA Inhibit Time has expired, the Over kVA Warning indication is instantaneous.

Power Factor Protection

The CEP9 Electronic Overload Relay has the capability to protect against power factor for specific applications that require the monitoring of both voltage and current. The user can protect or issue a warning in the event that the power factor of an electric motor is either too high or too low.

Under Power Factor Lagging Inhibit Time

Under Power Factor Lagging Inhibit Time (Parameter 410) allows the installer to inhibit an under power factor lagging trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 178 - Under Power Factor Lagging Inhibit Time (Parameter 410)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Over Power Factor Lagging Inhibit Time

Over Power Factor Lagging Inhibit Time (Parameter 414) allows the installer to inhibit an over power factor lagging trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 179 - Over Power Factor Lagging Inhibit Time (Parameter 414)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under Power Factor Leading Inhibit Time

Under Power Factor Leading Inhibit Time (Parameter 418) allows the installer to inhibit an under power factor leading trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 180 - Under Power Factor Leading Inhibit Time (Parameter 418)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Over Power Factor Leading Inhibit Time

Over Power Factor Leading Inhibit Time (Parameter 422) allows the installer to inhibit an over power factor leading trip and warning from occurring during the motor starting sequence. It is adjustable from 0...250 seconds.

Table 181 - Over Power Factor Leading Inhibit Time (Parameter 422)

Default Value	10
Minimum Value	0
Maximum Value	250
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	Sec

Under Power Factor Lagging Trip

The CEP9 Electronic Overload Relay will trip with an Under Power Factor Lagging indication if:

- No trip currently exists
- Under Power Factor Lagging Trip is enabled
- Current is present
- Voltage is present
- Under Power Factor Lagging Inhibit Time has expired
- The total power factor lagging is less than the Under Power Factor Lagging Trip Level for a time period greater than the Under Power Factor Lagging Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under power factor lagging, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 9-short blink pattern
- Bit 8 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under Power Factor Lagging Trip Delay

Under Power Factor Lagging Trip Delay (Parameter 411) allows the installer to define the time period an under power factor lagging condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 182 - Under Power Factor Lagging Trip Delay (Parameter 411)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under Power Factor Lagging Trip Level

Under Power Factor Lagging Trip Level (Parameter 412) allows the installer to define the power factor lagging at which the CEP9 Electronic Overload Relay will trip on an under power factor lagging. It is user-adjustable from 0...2,000,000 kW.

Table 183 - Under Power Factor Lagging Trip Level (Parameter 412)

Default Value	-90
Minimum Value	-100
Maximum Value	0
Parameter Type	SINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Under Power Factor Lagging Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under power factor lagging condition until the Under Power Factor Lagging Inhibit Time expires.

Under Power Factor Lagging Warning

The CEP9 Electronic Overload Relay will indicate an Under Power Factor Lagging warning if:

- No warning currently exists
- Under Power Factor Lagging Warning is enabled
- Current is present
- Voltage is present
- Under Power Factor Lagging Inhibit Time has expired
- The total power factor lagging is equal to or less than the Under Power Factor Lagging Warning Level

When the Under Power Factor Lagging Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 9-short blink pattern
- Bit 8 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under Power Factor Lagging Warn Level

Under Power Factor Lagging Warn Level (Parameter 413) allows the user to define the power factor lagging at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 184 - Under Power Factor Lagging Warn Level (Parameter 413)

Default Value	-95
Minimum Value	-100
Maximum Value	0
Parameter Type	SINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Under Power Factor Lagging Warning function does not include a time delay feature. Once the Under Power Factor Lagging Inhibit Time has expired, the Under Power Factor Lagging Warning indication is instantaneous.

Over Power Factor Lagging Trip

The CEP9 Electronic Overload Relay will trip with an Over Power Factor Lagging indication if:

- No trip currently exists
- Over Power Factor Lagging Trip is enabled
- Current is present
- Voltage is present
- Over Power Factor Lagging Inhibit Time has expired
- The total power factor lagging is greater than the Over Power Factor Lagging Trip Level for a time period greater than the Over Power Factor Lagging Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over power factor lagging, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 10-short blink pattern
- Bit 9 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over Power Factor Lagging Trip Delay

Over Power Factor Lagging Trip Delay (Parameter 415) allows the installer to define the time period an over power factor lagging condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 185 - Over Power Factor Lagging Trip Delay (Parameter 415)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over Power Factor Lagging Trip Level

Over Power Factor Lagging Trip Level (Parameter 416) allows the installer to define the total power factor lagging at which the CEP9 Electronic Overload Relay will trip on over power factor lagging. It is user-adjustable from 0...2,000,000 kW.

Table 186 - Over Power Factor Lagging Trip Level (Parameter 416)

Default Value	-95
Minimum Value	-100
Maximum Value	0
Parameter Type	SINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Over Power Factor Lagging Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over power factor lagging condition until the Over Power Factor Lagging Inhibit Time expires.

Over Power Factor Lagging Warning

The CEP9 Electronic Overload Relay will indicate an Over kVAR warning if:

- No warning currently exists
- Over Power Factor Lagging Warning is enabled
- Current is present
- Voltage is present
- Over Power Factor Lagging Inhibit Time has expired
- The total power factor lagging is equal to or greater than the Over Power Factor Lagging Warning Level

When the Over Power Factor Lagging Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 10-short blink pattern
- Bit 9 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over Power Factor Lagging Warn Level

Over Power Factor Lagging Warn Level (Parameter 417) allows the user to define the power factor lagging at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 187 - Over Power Factor Lagging Warn Level (Parameter 417)

Default Value	-90
Minimum Value	-100
Maximum Value	0
Parameter Type	SINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Over Power Factor Lagging Warning function does not include a time delay feature. Once the Over Power Factor Lagging Inhibit Time has expired, the Over Power Factor Lagging Warning indication is instantaneous.

Under Power Factor Leading Trip

The CEP9 Electronic Overload Relay will trip with an Under Power Factor Leading indication if:

- No trip currently exists
- Under Power Factor Leading Trip is enabled
- Current is present
- Voltage is present
- Under Power Factor Leading Inhibit Time has expired
- The total power factor leading is less than the Under Power Factor Leading Trip Level for a time period greater than the Under Power Factor Leading Trip Delay.

If the CEP9 Electronic Overload Relay trips on an under power factor leading, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 11-short blink pattern
- Bit 10 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Under Power Factor Leading Trip Delay

Under Power Factor Leading Trip Delay (Parameter 419) allows the installer to define the time period an under power factor leading condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 188 - Under Power Factor Leading Trip Delay (Parameter 419)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Under Power Factor Leading Trip Level

Under Power Factor Leading Trip Level (Parameter 420) allows the installer to define the power factor leading at which the CEP9 Electronic Overload Relay will trip on an under power factor leading. It is user-adjustable from 0...2,000,000 kW.

Table 189 - Under Power Factor Leading Trip Level (Parameter 420)

Default Value	90
Minimum Value	100
Maximum Value	0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Under Power Factor Leading Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an under power factor leading condition until the Under Power Factor Leading Inhibit Time expires.

Under Power Factor Leading Warning

The CEP9 Electronic Overload Relay will indicate an Under Power Factor Leading warning if:

- No warning currently exists
- Under Power Factor Leading Warning is enabled
- Current is present
- Voltage is present
- Under Power Factor Leading Inhibit Time has expired
- The total power factor leading is equal to or less than the Under Power Factor Leading Warning Level

When the Under Power Factor Leading Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 11-short blink pattern
- Bit 10 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Under Power Factor Leading Warn Level

Under Power Factor Leading Warn Level (Parameter 421) allows the user to define the power factor leading at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 190 - Under Power Factor Leading Warn Level (Parameter 421)

Default Value	95
Minimum Value	100
Maximum Value	0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Under Power Factor Leading Warning function does not include a time delay feature. Once the Under Power Factor Leading Inhibit Time has expired, the Under Power Factor Leading Warning indication is instantaneous.

Over Power Factor Leading Trip

The CEP9 Electronic Overload Relay will trip with an Over Power Factor Leading indication if:

- No trip currently exists
- Over Power Factor Leading Trip is enabled
- Current is present
- Voltage is present
- Over Power Factor Leading Inhibit Time has expired
- The total power factor leading is greater than the Over Power Factor Leading Trip Level for a time period greater than the Over Power Factor Leading Trip Delay.

If the CEP9 Electronic Overload Relay trips on an over power factor leading, the:

- TRIP/WARN LED status indicator will flash a red 2-long / 12-short blink pattern
- Bit 11 in Power Trip Status (Parameter 6) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Over Power Factor Leading Trip Delay

Over Power Factor Leading Trip Delay (Parameter 423) allows the installer to define the time period an over power factor leading condition must be present before a trip occurs. It is adjustable from 0.1...25.0 seconds.

Table 191 - Over Power Factor Leading Trip Delay (Parameter 423)

Default Value	1.0
Minimum Value	0.1
Maximum Value	25.0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	10
Units	Sec

Over Power Factor Leading Trip Level

Over Power Factor Leading Trip Level (Parameter 424) allows the installer to define the total power factor leading at which the CEP9 Electronic Overload Relay will trip on over power factor leading. It is user-adjustable from 0...2,000,000 kW.

Table 192 - Over Power Factor Leading Trip Level (Parameter 424)

Default Value	95
Minimum Value	100
Maximum Value	0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Over Power Factor Leading Inhibit Time starts after a phase voltage transitions from 0V to 20V L-L and a phase of load current transitions from 0A to 30% of the device's minimum FLA setting. The CEP9 Electronic Overload Relay does not begin monitoring for an over power factor leading condition until the Over Power Factor Leading Inhibit Time expires.

Over Power Factor Leading Warning

The CEP9 Electronic Overload Relay will indicate an Over kVAR warning if:

- No warning currently exists
- Over Power Factor Leading Warning is enabled
- Current is present
- Voltage is present
- Over Power Factor Leading Inhibit Time has expired
- The total power factor leading is equal to or greater than the Over Power Factor Leading Warning Level

When the Over Power Factor Leading Warning conditions are satisfied, the:

- TRIP/WARN LED will flash a yellow 2-long / 12-short blink pattern
- Bit 11 in Power Warning Status (Parameter 12) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Over Power Factor Leading Warn Level

Over Power Factor Leading Warn Level (Parameter 425) allows the user to define the power factor leading at which the CEP9 Electronic Overload Relay will indicate a warning. It is user-adjustable from 0...2,000,000 kW.

Table 193 - Over Power Factor Leading Warn Level (Parameter 425)

Default Value	90
Minimum Value	100
Maximum Value	0
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

IMPORTANT The Over Power Factor Leading Warning function does not include a time delay feature. Once the Over Power Factor Leading Inhibit Time has expired, the Over Power Factor Leading Warning indication is instantaneous.

Control-Based Protection

The CEP9 Electronic Overload Relay provides a number of control-based protection functions including:

- Test Trip
- Operator Station Trip
- Remote Trip
- Start Inhibit
- Preventive Maintenance
- Configuration Trip
- Option Match Trip/Warning
- Expansion Bus Trip/Warning
- Non Volatile Storage Trip
- Test Mode Trip

Control Trip Enable (Parameter 186) and Control Warning Enable (Parameter 192) are used to enable the respective control based protective trip and warning functions.

Table 194 - Control Trip Enable (Parameter 186)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Test Trip Enable
														X		PTC Trip Enable
													X			DeviceLogix Trip Enable
												X				Operator Station Trip Enable
											X					Remote Trip Enable
										X						Blocked Start Trip Enable
									X							Hardware Fault Trip Enable
								X								Configuration Trip Enable
							X									Option Match Trip Enable
						X										Feedback Timeout Trip Enable
					X											Expansion Bus Trip Enable
																Reserved
																Reserved
		X														Non-Volatile Memory Trip Enable
	X															Test Mode Trip Enable
																Reserved

Control Trip Status (Parameter 7) and Control Warning Status (Parameter 13) are used to monitor the respective current based protective trip and warning functions.

Table 195 - Control Warning Enable (Parameter 192)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
																Reserved
																Reserved
													X			DeviceLogix Warning Enable
												X				Operator Station Warning Enable
																Reserved
																Reserved
																Reserved
																Reserved
							X									Option Match Warning Enable
						X										Feedback Timeout Warning Enable
					X											Expansion Bus Warning Enable
				X												Number Of Starts Warning Enable
			X													Operating Hours Warning Enable
																Reserved
																Reserved
																Reserved

Table 196 - Control Trip Status (Parameter 7)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Test Trip
														X		PTC Trip
													X			DeviceLogix Trip
												X				Operator Station Trip
											X					Remote Trip
										X						Blocked Start Trip
									X							Hardware Fault Trip
								X								Configuration Trip
							X									Option Match Trip
						X										Feedback Timeout Trip
					X											Expansion Bus Trip
																Reserved
																Reserved
		X														Non-Volatile Memory Trip
	X															Test Mode Trip
																Reserved

Table 197 - Control Warning Status (Parameter 13)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
																Reserved
														X		PTC Warning
													X			DeviceLogix Warning
												X				Operator Station Warning
																Reserved
																Reserved
																Reserved
																Reserved
							X									Option Match Warning
						X										Feedback Timeout Warning
					X											Expansion Bus Warning
				X												Number Of Starts Warning
			X													Operating Hours Warning
																Reserved
																Reserved
																Reserved

Test Trip

The CEP9 Electronic Overload Relay provides the capability to put the overload relay into a Test Trip state. Users can implement this feature when commissioning a motor control circuit to verify the response of the CEP9 Electronic Overload Relay, its associated Expansion I/O modules, and the networked automation system.

The CEP9 Electronic Overload Relay will trip with a test trip indication if:

- No trip currently exists
- Test Trip protection is enabled
- The user presses the blue reset button on the Communication Module for more than 3 seconds.

If the CEP9 Electronic Overload Relay trips on a test trip, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 1-short blink pattern
- Bit 0 in Control Trip Status (Parameter 7) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Operator Station Trip

The CEP9 Electronic Overload Relay provides the capability to plug and play its optional operator stations. The operator station protection feature trips the CEP9 Electronic Overload Relay when the user presses the red O (stop) button. This feature is a failsafe mechanism to allow users to de-energize a contactor coil anytime the red O (stop) button is pressed.

Operator Station Trip should be disabled when an operator station is being used to send start and stop signals to an automation control system.

The CEP9 Electronic Overload Relay will trip with an operator station trip indication if:

- No trip currently exists
- Operator Station Trip is enabled
- The user presses the red O button on an operator station

If the CEP9 Electronic Overload Relay trips on an operator station trip, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 4-short blink pattern
- Bit 3 in Control Trip Status (Parameter 7) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open

- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Remote Trip

The CEP9 Electronic Overload Relay provides the capability to remotely cause the CEP9 Electronic Overload Relay to trip via a network command or assigned digital input on the Control Module (see Chapter 3 for digital input assignments). This feature allows the capability of tripping the CEP9 Electronic Overload Relay from a remote source such as a vibration switch or external monitoring relay.

The CEP9 Electronic Overload Relay will trip with a remote trip indication if:

- No trip currently exists
- Remote Trip is enabled
- A Control Module's digital input with a remote trip assignment is activated or the Communication Module receives a remote trip command from the communications network

If the CEP9 Electronic Overload Relay trips on a remote trip, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 5-short blink pattern
- Bit 4 in Control Trip Status (Parameter 7) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open

- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Start Inhibit Protection

This protective function allows the user to limit the number of starts in a given time period and limit the operating hours for an electric motor. A start is defined as the CEP9 Electronic Overload Relay Overload Relay sensing a transition in current from 0A to 30% of the device's minimum FLA rating. The Blocked Start protective function is set by Starts Per Hour (Parameter 205) and/or Starts Interval (Parameter 206).

Blocked Start Trip

The CEP9 Electronic Overload Relay will trip with a blocked start trip indication if:

- No trip currently exists
- Blocked Start Trip is enabled
- The number of starts within the past hour equals the value set in Starts Per Hour (Parameter 205)
- The time between starts is less than the value set in Starts Interval (Parameter 206)

If the CEP9 Electronic Overload Relay trips on a blocked start trip, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 6-short blink pattern
- Bit 5 in Control Trip Status (Parameter 7) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Starts Per Hour

Starts Per Hour (Parameter 205) is the number of starts within the last hour (60 minutes). This value is adjustable from 0...120 starts.

Table 198 - Starts Per Hour (Parameter 205)

Default Value	2
Minimum Value	0
Maximum Value	120
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Starts Interval

Starts Interval (Parameter 206) is the time that the user must wait between starts. This value is adjustable from 0...3600 seconds.

Table 199 - Starts Interval (Parameter 206)

Default Value	600
Minimum Value	0
Maximum Value	3600
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Sec

Starts Available

Starts Available (Parameter 30) reports the number of starts currently available based on the blocked start settings and the actual motor starting events.

Table 200 - Starts Available (Parameter 30)

Default Value	0
Minimum Value	0
Maximum Value	120
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Time to Start

Time to Start (Parameter 31) reports the amount of the time remaining until a new start can be issued. If the Time to Start time has elapsed, this parameter will report zero until the next Blocked Start trip occurs.

Table 201 - Time to Start (Parameter 31)

Default Value	0
Minimum Value	0
Maximum Value	3600
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Sec

Preventive Maintenance

The CEP9 Electronic Overload Relay offers preventive maintenance warnings based on the number of start cycles and the number of operating hours. These warnings can be used to alert the user that the number of starts or number of operating hours has been reached, and it is time to perform preventive maintenance.

Number of Starts Warning

The CEP9 Electronic Overload Relay will warn with a number of starts warning indication if:

- No warning currently exists
- Number of Starts Warning is enabled
- The value in Starts Counter (Parameter 29) is greater than the value set in Total Starts (Parameter 207)

If the CEP9 Electronic Overload Relay warns on a number of starts warning, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 12-short blink pattern
- Bit 11 in Control Warning Status (Parameter 13) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Total Starts

Total Starts (Parameter 207) allows the user to set the number starts until the starts counter warning occurs.

Table 202 - Total Starts (Parameter 207)

Default Value	0
Minimum Value	0
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Starts Counter

Starts Counter (Parameter 29) represents the number of times a motor has been started. This value can be reset to zero using the Clear Command (Parameter 165) function *Clear Operating Statistics*.

Table 203 - Starts Counter (Parameter 29)

Default Value	0
Minimum Value	0
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Operating Hours Warning

The CEP9 Electronic Overload Relay will warn with an operating hours warning indication if:

- No warning currently exists
- Operating Hours Warning is enabled
- The value in Operating Time (Parameter 28) is greater than the value set in Total Operating Hours (Parameter 208)

If the CEP9 Electronic Overload Relay warns on an operating hours warning, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 13-short blink pattern
- Bit 12 in Control Warning Status (Parameter 13) will set to 1
- Bit 1 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Warning Alarm will close

Total Operating Hours

Total Operating Hours (Parameter 208) allows the user to set the number operating hours that a motor can operate until the operating hours warning occurs.

Table 204 - Total Operating Hours (Parameter 208)

Default Value	0
Minimum Value	0
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Hours

Operating Time

Operating Time (Parameter 28) represents the number hours that a motor has been running. This value can be reset to zero using the Clear Command (Parameter 165) function *Clear Operating Statistics*.

Table 205 - Operating Time (Parameter 28)

Default Value	0
Minimum Value	0
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Hours

Hardware Fault

The CEP9 Electronic Overload Relay continuously monitors the status of the Control, Sensing, and Communication Modules. The CEP9 Electronic Overload Relay will issue a hardware fault trip if there is an issue with the Control, Sensing, and Communications Modules or if one of the modules is missing or incompatible. The Hardware Fault Trip is always enabled.

The CEP9 Electronic Overload Relay will trip with a hardware fault trip indication if:

- No trip currently exists
- Hardware Fault Trip is enabled
- An issue exists between the Control Module, Sensing Module, and/or Communication Module

If the CEP9 Electronic Overload Relay trips on a hardware fault trip, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 7-short blink pattern
- Bit 6 in Control Trip Status (Parameter 7) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Configuration Trip

Refer to Invalid Configuration Mode in Chapter 3 for more information on Configuration Trip.

Option Match

Refer to Option Match in Chapter 3 for more information on Option Match Trip and Warning.

Expansion Bus Fault

Refer to Expansion Bus Fault in Chapter 3 for more information on Expansion Bus Trip and Warning.

Non-Volatile Storage Fault

The CEP9 Electronic Overload Relay continuously monitors the status of its non-volatile storage. The CEP9 Electronic Overload Relay will issue a non-volatile storage fault trip if there is an issue with its non-volatile storage or if it becomes corrupt. The Non-Volatile Storage Fault Trip is always enabled.

The CEP9 Electronic Overload Relay will trip with a hardware fault trip indication if:

- No trip currently exists
- Non-Volatile Storage Fault Trip is enabled
- An issue exists in the CEP9 Electronic Overload Relay's non-volatile storage

If the CEP9 Electronic Overload Relay trips on a non-volatile storage fault trip, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 14-short blink pattern
- Bit 13 in Control Trip Status (Parameter 7) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

Test Mode Trip

Some motor control center enclosures include a Test Position in which the motor power is disconnected from the enclosure, but the control power is still active. This allows motor control center commissioning staff to verify that the motor starter is mechanically working and communications are established with the automation control system. The CEP9 Electronic Overload Relay provides the

capability to put the overload relay into a Test Mode Trip state if motor control center enclosure is in a test position, and the CEP9 Electronic Overload Relay detects motor current and/or voltage is present.

The CEP9 Electronic Overload Relay will trip with a test mode trip indication if:

- No trip currently exists.
- Test Mode Trip protection is enabled.
- The digital input assigned to read the Test Position feedback is active. See Input Assignments (Parameters 196-201) in Chapter 3.
- Motor current and/or voltage is present.

If the CEP9 Electronic Overload Relay trips on a test mode trip, the following will occur:

- The TRIP/WARN LED will flash a red 3-long / 15-short blink pattern
- Bit 14 in Control Trip Status (Parameter 7) will set to 1
- Bit 0 in Device Status 0 (Parameter 20) will set to 1
- Any relay outputs configured as a Trip Relay will open
- Any relay outputs configured as a Control Relay will open
- Any relay outputs configured as a Trip Alarm will close
- Any relay outputs configured as a Normal Relay will be placed in their Protection Fault state (if so programmed)

IMPORTANT The Protection Fault State of Relay 0, Relay 1, Relay 2, Digital Module 1 Output Relays, Digital Module 2 Output Relays, Digital Module 3 Output Relays, and Digital Module 4 Output Relays are defined by the respective parameters:

- Output PT00 Protection Fault Action (Parameter 304)
- Output PT00 Protection Fault Value (Parameter 305)
- Output PT01 Protection Fault Action (Parameter 310)
- Output PT01 Protection Fault Value (Parameter 311)
- Output PT02 Protection Fault Action (Parameter 316)
- Output PT02 Protection Fault Value (Parameter 317)
- Output Digital Module 1 Protection Fault Action (Parameter 322)
- Output Digital Module 1 Protection Fault Value (Parameter 323)
- Output Digital Module 2 Protection Fault Action (Parameter 328)
- Output Digital Module 2 Protection Fault Value (Parameter 329)
- Output Digital Module 3 Protection Fault Action (Parameter 334)
- Output Digital Module 3 Protection Fault Value (Parameter 335)
- Output Digital Module 4 Protection Fault Action (Parameter 340)
- Output Digital Module 4 Protection Fault Value (Parameter 342)

IMPORTANT Motor current is detected when a phase of load current transitions from 0 A to 30% of the device's minimum FLA setting

Notes:

Commands

Introduction

The purpose of this chapter is to provide detailed information regarding the resetting, clearing, and pre-configuration functions of the CEP9 Electronic Overload Relay. The CEP9 Electronic Overload Relay provides three types of commands:

- Trip Reset
- Configuration Preset
- Clear Command

Trip Reset

Trip Reset (Parameter 163) allows the user to reset an CEP9 Electronic Overload Relay when it is in a tripped state. Trip Reset has the same functionality as pressing the blue reset button on CEP9 communication module and using the Trip Reset bit in the consumed output assemblies of a communications network.

A trip reset can only be performed when all conditions for the trip event have been cleared. For an overload trip event, the % Thermal Capacity Utilized (Parameter 1) must be below the value specified in Overload Reset Level (Parameter 174).

Table 206 - Trip Reset (Parameter 163)

Default Value	0 = Ready
Range	0 = Ready 1 = Trip Reset
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Configuration Preset

The CEP9 Electronic Overload Relay has a number of preset configurations which allows the user to quickly configure all of the configuration parameters needed for a specific operating mode in a single command. This command also allows the user to restore the factory default values for all configuration parameters in the CEP9 Electronic Overload Relay.

Table 207 - Config Preset (Parameter 164)

Default Value	0 = Ready
Range	0 = Ready 1 = Factory Defaults
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Listed below are the available configuration presets and the values for the associated pre-configured configuration values.

Factory Defaults

When the Factory Defaults configuration preset command is selected, the CEP9 Electronic Overload Relay will restore all configuration parameters back their original factory default values.

Figure 41 - Factory Default Values

Number	Parameter Name	Default Value	Units
139	TripHistoryMaskI	0xFFFF	
140	TripHistoryMaskV	0x003F	
141	TripHistoryMaskP	0x0FFF	
142	TripHistoryMaskC	0x27FF	
143	TripHistoryMaskA	0x0FFF	
145	WarnHistoryMaskI	0xFFFF	
146	WarnHistoryMaskV	0x003F	
147	WarnHistoryMaskP	0x0FFF	
148	WarnHistoryMaskC	0x1FFF	
149	WarnHistoryMaskA	0x0FFF	
171	FLASetting	0.50	Amps
172	TripClass	10	
173	OLPTCResetMode	Automatic	
174	OLResetLevel	75	%TCU
175	OLWarningLevel	85	%TCU
176	SingleOrThreePh	Three Phase	
177	FLA2Setting	0.50	Amps
183	TripEnableI	0x0003	

Number	Parameter Name	Default Value	Units
304	OutPt00PrFltAct	Goto Value	
305	OutPt00PrFltVal	Open	
306	OutPt00ComFltAct	Goto Value	
307	OutPt00ComFltVal	Open	
308	OutPt00ComIdlAct	Goto Value	
309	OutPt00ComIdlVal	Open	
310	OutPt01PrFltAct	Goto Value	
311	OutPt01PrFltVal	Open	
312	OutPt01ComFltAct	Goto Value	
313	OutPt01ComFltVal	Open	
314	OutPt01ComIdlAct	Goto Value	
315	OutPt01ComIdlVal	Open	
316	OutPt02PrFltAct	Goto Value	
317	OutPt02PrFltVal	Open	
318	OutPt02ComFltAct	Goto Value	
319	OutPt02ComFltVal	Open	
320	OutPt02ComIdlAct	Goto Value	
321	OutPt02ComIdlVal	Open	

Number	Parameter Name	Default Value	Units
428	Screen1Param1	1	
429	Screen1Param2	50	
430	Screen2Param1	2	
431	Screen2Param2	3	
432	Screen3Param1	51	
433	Screen3Param2	52	
434	Screen4Param1	38	
435	Screen4Param2	39	
436	DisplayTimeout	300	Sec
437	InAnMod1Ch00Type	Disable	
438	InAMod1Ch0Format	Eng Units	
439	InAMod1C0TmpUnit	Degrees C	
440	InAMod1C0FiltFrq	17 Hz	
441	InAMod1C0OpCktSt	Upscale	
442	InAnMod1Ch0RTDEn	3-Wire	
443	InAMod1C0TripDly	1.0	Sec
444	InAMod1C0TripLvl	0	
445	InAMod1C0WarnLvl	0	

Number	Parameter Name	Default Value	Units
184	TripEnableV	0	
185	TripEnableP	0	
186	TripEnableC	0x20C9	
187	TripEnableA	0	
189	WarningEnableI	0	
190	WarningEnableV	0	
191	WarningEnableP	0	
192	WarningEnableC	0	
CEP9	WarningEnableA	0	
195	SetOperatingMode	Net Overload	
196	InPt00Assignment	Normal	
197	InPt01Assignment	Normal	
198	InPt02Assignment	Normal	
199	InPt03Assignment	Normal	
200	InPt04Assignment	Normal	
201	InPt05Assignment	Normal	
202	OutPt0Assignment *	Trip Relay	
203	OutPt1Assignment	Normal	
204	OutPt2Assignment	Normal	
205	StartsPerHour	2	
206	StartsInterval	600	Sec
207	PMTotalStarts	0	
208	PMOperatingHours	0	Hrs
209	ActFLA2wOutput	Disable	
211	SecurityPolicy	0x801F	
212	Language	English	
213	FeedbackTimeout	500	
214	TransitionDelay	10000	
215	InterlockDelay	100	
216	EmergencyStartEn	Disable	
221	ControlModuleTyp	Ignore	
222	SensingModuleTyp	Ignore	
223	CommsModuleType	Ignore	
224	OperStationType	Ignore	
225	DigitalMod1Type	Ignore	
226	DigitalMod2Type	Ignore	

Number	Parameter Name	Default Value	Units
322	OutDig1PrFltAct	Goto Value	
323	OutDig1PrFltVal	Open	
324	OutDig1ComFltAct	Goto Value	
325	OutDig1ComFltVal	Open	
326	OutDig1ComIdlAct	Goto Value	
327	OutDig1ComIdlVal	Open	
328	OutDigp2PrFltAct	Goto Value	
329	OutDig2PrFltVal	Open	
330	OutDig2ComFltAct	Goto Value	
331	OutDig2ComFltVal	Open	
332	OutDig2ComIdlAct	Goto Value	
333	OutDig2ComIdlVal	Open	
334	OutDig3PrFltAct	Goto Value	
335	OutDig3PrFltVal	Open	
336	OutDig3ComFltAct	Goto Value	
337	OutDig3ComFltVal	Open	
338	OuDig3ComIdlAct	Goto Value	
339	OutDig3ComIdlVal	Open	
340	OutDig4PrFltAct	Goto Value	
341	OutDig4PrFltVal	Open	
342	OutDig4ComFltAct	Goto Value	
343	OutDig4ComFltVal	Open	
344	OutDig4ComIdlAct	Goto Value	
345	OutDig4ComIdlVal	Open	
346	CommOverride	Disable	
347	NetworkOverride	Disable	
350	PtDevOutCOSMask	0x0000	
352	VoltageMode	Delta	
353	PTPrimary	480	
354	PTSecondary	480	
355	UVInhibitTime	10	Sec
356	UVTripDelay	1.0	Sec
357	UVTripLevel	100.0	Volt
358	UVWarningLevel	400.0	Volt
359	OVInhibitTime	10	Sec
360	OVTripDelay	1.0	Sec

Number	Parameter Name	Default Value	Units
446	InAnMod1Ch01Type	Disable	
447	InAMod1Ch1Format	Eng Units	
448	InAMod1C1TmpUnit	Degrees C	
449	InAMod1C1FiltFrq	17 Hz	
450	InAMod1C1OpCktSt	Upscale	
451	InAnMod1Ch1RTDEn	3-Wire	
452	InAMod1C1TripDly	1.0	Sec
453	InAMod1C1TripLvl	0	
454	InAMod1C1WarnLvl	0	
455	InAnMod1Ch02Type	Disable	
456	InAMod1Ch2Format	Eng Units	
457	InAMod1C2TmpUnit	Degrees C	
458	InAMod1C2FiltFrq	17 Hz	
459	InAMod1C2OpCktSt	Upscale	
460	InAnMod1Ch2RTDEn	3-Wire	
461	InAMod1C2TripDly	1.0	Sec
462	InAMod1C2TripLvl	0	
463	InAMod1C2WarnLvl	0	
464	OutAnMod1Type	Disable	
465	OutAnMod1Select	Ave %FLA	
466	OutAnMod1FltActn	Zero	
467	OutAnMod1IdlActn	Zero	
468	InAnMod2Ch00Type	Disable	
469	InAMod2Ch0Format	Eng Units	
470	InAMod2C0TmpUnit	Degrees C	
471	InAMod2C0FiltFrq	17 Hz	
472	InAMod2C0OpCktSt	Upscale	
473	InAnMod2Ch0RTDEn	3-Wire	
474	InAMod2C0TripDly	1.0	Sec
475	InAMod2C0TripLvl	0	
476	InAMod2C0WarnLvl	0	
477	InAnMod2Ch01Type	Disable	
478	InAMod2Ch1Format	Eng Units	
479	InAMod2C1TmpUnit	Degrees C	
480	InAMod2C1FiltFrq	17 Hz	
481	InAMod2C1OpCktSt	Upscale	

Number	Parameter Name	Default Value	Units
227	DigitalMod3Type	Ignore	
228	DigitalMod4Type	Ignore	
229	AnalogMod1Type	Ignore	
230	AnalogMod2Type	Ignore	
231	AnalogMod3Type	Ignore	
232	AnalogMod4Type	Ignore	
233	MismatchAction	0x0000	
239	PLInhibitTime	0	Sec
240	PLTripDelay	1	Sec
241	GroundFaultType	Internal	
242	GFInhibitTime	10	Sec
243	GFTripDelay	0.5	Sec
244	GFTripLevel	2.50	Amps
245	GFWarningDelay	0	Sec
246	GFWarningLevel	2.00	Amps
247	GFFilter	Disable	
248	GFMaxInhibit	Disable	
249	StallEnabledTime	10	Sec
250	StallTripLevel	600	%FLA
251	JamInhibitTime	10	Sec
252	JamTripDelay	5.0	Sec
253	JamTripLevel	250	%FLA
254	JamWarningLevel	150	%FLA
255	ULInhibitTime	10	Sec
256	ULTripDelay	5.0	Sec
257	ULTripLevel	50	%FLA
258	ULWarningLevel	70	%FLA
259	CIInhibitTime	10	Sec
260	CITripDelay	5.0	Sec
261	CITripLevel	35	%
262	CIWarningLevel	20	%
263	CTPrimary	5	
264	CTSecondary	5	
265	UCInhibitTime	10	Sec
266	L1UCTripDelay	1.0	Sec
267	L1UCTripLevel	35	%
268	L1UCWarningLevel	40	%
269	L2UCTripDelay	1.0	Sec
270	L2UCTripLevel	35	%
271	L2UCWarningLevel	40	%
272	L3UCTripDelay	1.0	Sec
273	L3UCTripLevel	35	%

Number	Parameter Name	Default Value	Units
361	OVTripLevel	500.0	Volt
362	OVWarningLevel	490.0	Volt
363	PhRotInhibitTime	10	Sec
364	PhaseRotTripType	ABC	
365	VIBInhibitTime	10	Sec
366	VIBTripDelay	1.0	Sec
367	VIBTripLevel	15	%
368	VIBWarningLevel	10	%
369	UFInhibitTime	10	Sec
370	UFTripDelay	1.0	Sec
371	UFTripLevel	57	Hz
372	UFWarningLevel	58	Hz
373	OFInhibitTime	10	Sec
374	OFTripDelay	1.0	Sec
375	OFTripLevel	63	Hz
376	OFWarningLevel	62	Hz
377	PowerScale	kW	
378	UWInhibitTime	10	Sec
379	UWTripDelay	1.0	Sec
380	UWTripLevel	0.000	kW
381	UWWarningLevel	0.000	kW
382	OWInhibitTime	10	Sec
383	OWTripDelay	1.0	Sec
384	OWTripLevel	0.000	kW
385	OWWarningLevel	0.000	kW
386	UVARCInhibitTime	10	Sec
387	UVARCTripDelay	1.0	Sec
388	UVARCTripLevel	0.000	kVAR
389	UVARCWarnLevel	0.000	kVAR
390	OVARCInhibitTime	10	Sec
391	OVARCTripDelay	1.0	Sec
392	OVARCTripLevel	0.000	kVAR
393	OVARCWarnLevel	0.000	kVAR
394	UVARGInhibitTime	10	Sec
395	UVARGTripDelay	1.0	Sec
396	UVARGTripLevel	0.000	kVAR
397	UVARGWarnLevel	0.000	kVAR
398	OVARGInhibitTime	10	Sec
399	OVARGTripDelay	1.0	Sec
400	OVARGTripLevel	0.000	kVAR
401	OVARGWarnLevel	0.000	kVAR
402	UVAInhibitTime	10	Sec

Number	Parameter Name	Default Value	Units
482	InAnMod2Ch1RTDEn	3-Wire	
483	InAMod2C1TripDly	1.0	Sec
484	InAMod2C1TripLvl	0	
485	InAMod2C1WarnLvl	0	
486	InAnMod2Ch02Type	Disable	
487	InAMod2Ch2Format	Eng Units	
488	InAMod2C2TmpUnit	Degrees C	
489	InAMod2C2FiltFrq	17 Hz	
490	InAMod2C2OpCktSt	Upscale	
491	InAnMod2Ch2RTDEn	3-Wire	
492	InAMod2C2TripDly	1.0	Sec
493	InAMod2C2TripLvl	0	
494	InAMod2C2WarnLvl	0	
495	OutAnMod2Type	Disable	
496	OutAnMod2Select	Ave %FLA	
497	OutAnMod2FltActn	Zero	
498	OutAnMod2dlActn	Zero	
499	InAnMod3Ch00Type	Disable	
500	InAMod3Ch0Format	Eng Units	
501	InAMod3C0TmpUnit	Degrees C	
502	InAMod3C0FiltFrq	17 Hz	
503	InAMod3C0OpCktSt	Upscale	
504	InAnMod3Ch0RTDEn	3-Wire	
505	InAMod3C0TripDly	1.0	Sec
506	InAMod3C0TripLvl	0	
507	InAMod3C0WarnLvl	0	
508	InAnMod3Ch01Type	Disable	
509	InAMod3Ch1Format	Eng Units	
510	InAMod3C1TmpUnit	Degrees C	
511	InAMod3C1FiltFrq	17 Hz	
512	InAMod3C1OpCktSt	Upscale	
513	InAnMod3Ch1RTDEn	3-Wire	
514	InAMod3C1TripDly	1.0	Sec
515	InAMod3C1TripLvl	0	
516	InAMod3C1WarnLvl	0	
517	InAnMod3Ch02Type	Disable	
518	InAMod3Ch2Format	Eng Units	
519	InAMod3C2TmpUnit	Degrees C	
520	InAMod3C2FiltFrq	17 Hz	
521	InAMod3C2OpCktSt	Upscale	
522	InAnMod3Ch2RTDEn	3-Wire	
523	InAMod3C2TripDly	1.0	Sec

Number	Parameter Name	Default Value	Units
274	L3UCWarningLevel	40	%
275	OCInhibitTime	10	Sec
276	L1OCTripDelay	1.0	Sec
277	L1OCTripLevel	100	%
278	L1OCWarningLevel	90	%
279	L2OCTripDelay	1.0	Sec
280	L2OCTripLevel	100	%
281	L2OCWarningLevel	90	%
282	L3OCTripDelay	1.0	Sec
283	L3OCTripLevel	100	%
284	L3OCWarningLevel	90	%
285	LineLossInhTime	10	Sec
286	L1LossTripDelay	1.0	Sec
287	L2LossTripDelay	1.0	Sec
288	L3LossTripDelay	1.0	Sec
291	Datalink0	0	
292	Datalink1	0	
293	Datalink2	0	
294	Datalink3	0	
295	Datalink4	0	
296	Datalink5	0	
297	Datalink6	0	
298	Datalink7	0	

Number	Parameter Name	Default Value	Units
403	UVATripDelay	1.0	Sec
404	UVATripLevel	0.000	kVA
405	UVAWarningLevel	0.000	kVA
406	OVAInhibitTime	10	Sec
407	OVATripDelay	1.0	Sec
408	OVATripLevel	0.000	kVA
409	OVAWarningLevel	0.000	kVA
410	UPFLagInhibTime	10	Sec
411	UPFLagTripDelay	1.0	Sec
412	UPFLagTripLevel	-90	%
413	UPFLagWarnLevel	-95	%
414	OPFLagInhibTime	10	Sec
415	OPFLagTripDelay	1.0	Sec
416	OPFLagTripLevel	-95	%
417	OPFLagWarnLevel	-90	%
418	UPFLeadInhibTime	10	Sec
419	UPFLeadTripDelay	1.0	Sec
420	UPFLeadTripLevel	90	%
421	UPFLeadWarnLevel	95	%
422	OPFLeadInhibTime	10	Sec
423	OPFLeadTripDelay	1.0	Sec
424	OPFLeadTripLevel	95	%
425	OPFLeadWarnLevel	90	%
426	DemandPeriod	15	Min
427	NumberOfPeriods	1	

Number	Parameter Name	Default Value	Units
524	InAMod3C2TripLvl	0	
525	InAMod3C2WarnLvl	0	
526	OutAnMod3Type	Disable	
527	OutAnMod3Select	Ave %FLA	
528	OutAnMod3FltActn	Zero	
529	OutAnMod3dlActn	Zero	
530	InAnMod4Ch00Type	Disable	
531	InAMod4Ch0Format	Eng Units	
532	InAMod3C0TmpUnit	Degrees C	
533	InAMod4C0FiltFrq	17 Hz	
534	InAMod4C0OpCktSt	Upscale	
535	InAnMod4Ch0RTDEn	3-Wire	
536	InAMod4C0TripDly	1.0	Sec
537	InAMod4C0TripLvl	0	
538	InAMod4C0WarnLvl	0	
539	InAnMod4Ch01Type	Disable	
540	InAMod4Ch1Format	Eng Units	
541	InAMod4C1TmpUnit	Degrees C	
542	InAMod4C1FiltFrq	17 Hz	
543	InAMod4C1OpCktSt	Upscale	
544	InAnMod4Ch1RTDEn	3-Wire	
545	InAMod4C1TripDly	1.0	Sec
546	InAMod4C1TripLvl	0	
547	InAMod4C1WarnLvl	0	
548	InAnMod4Ch02Type	Disable	
549	InAMod4Ch2Format	Eng Units	
550	InAMod4C2TmpUnit	Degrees C	
551	InAMod4C2FiltFrq	17 Hz	
552	InAMod4C2OpCktSt	Upscale	
553	InAnMod4Ch2RTDEn	3-Wire	
554	InAMod4C2TripDly	1.0	Sec
555	InAMod4C2TripLvl	0	
556	InAMod4C2WarnLvl	0	
557	OutAnMod4Type	Disable	
558	OutAnMod4Select	Ave %FLA	
559	OutAnMod4FltActn	Zero	
560	OutAnMod4dlActn	Zero	

Clear Command

Clear Command (Parameter 165) allows the user to clear historical logs, operating statistics, and energy data within the non-volatile memory of the CEP9 Electronic Overload Relay.

Table 208 - Clear Command (Parameter 165)

Default Value	0 = Ready
Range	0 = Ready
	1 = Clear Operating Statistics
	2 = Clear History Logs
	3 = Clear %TCU
	4 = Clear kWh
	5 = Clear kVARh
	6 = Clear kVAh
	7 = Clear Max kW Demand
	8 = Clear Max kVAR Demand
	9 = Clear Max kVA Demand
	10 = Clear All
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Clear Operating Statistics

When the Clear Operating Statistics command is issued, the CEP9 Electronic Overload Relay will set the following parameters to a value of zero (0):

- Operating Time (Parameter 28)
- Starts Counter (Parameter 29)

Clear History Logs

When the Clear History Logs command is issued, the CEP9 Electronic Overload Relay will set the following parameters to a value of zero (0):

- Trip History 0 (Parameter 127)
- Trip History 1 (Parameter 128)
- Trip History 2 (Parameter 129)
- Trip History 3 (Parameter 130)
- Trip History 4 (Parameter 131)
- Warning History 0 (Parameter 132)
- Warning History 1 (Parameter 133)
- Warning History 2 (Parameter 134)
- Warning History 3 (Parameter 135)
- Warning History 4 (Parameter 136)

Clear %TCU

When the Clear %TCU command is issued, the CEP9 Electronic Overload Relay will set % Thermal Capacity Utilized (Parameter 1) to a value of zero (0).

Clear kWh

When the Clear kWh command is issued, the CEP9 Electronic Overload Relay will set the following parameters to a value of zero (0):

- kWh x 10^{9} (Parameter 80)
- kWh x 10^{6} (Parameter 81)
- kWh x 10^{3} (Parameter 82)
- kWh x 10^{0} (Parameter 83)
- kWh x 10^{-3} (Parameter 84)

Clear kVARh

When the Clear kVARh command is issued, the CEP9 Electronic Overload Relay will set the following parameters to a value of zero (0):

- kVARh Consumed x 10^{9} (Parameter 85)
- kVARh Consumed x 10^{6} (Parameter 86)
- kVARh Consumed x 10^{3} (Parameter 87)
- kVARh Consumed x 10^{0} (Parameter 88)
- kVARh Consumed x 10^{-3} (Parameter 89)
- kVARh Generated x 10^{9} (Parameter 90)
- kVARh Generated x 10^{6} (Parameter 91)
- kVARh Generated x 10^{3} (Parameter 92)
- kVARh Generated x 10^{0} (Parameter 93)
- kVARh Generated x 10^{-3} (Parameter 94)
- kVARh Net x 10^{9} (Parameter 95)
- kVARh Net x 10^{6} (Parameter 96)
- kVARh Net x 10^{3} (Parameter 97)
- kVARh Net x 10^{0} (Parameter 98)
- kVARh Net x 10^{-3} (Parameter 99)

Clear kVAh

When the Clear kVAh command is issued, the CEP9 Electronic Overload Relay will set the following parameters to a value of zero (0):

- kVAh x 10^{9} (Parameter 100)
- kVAh x 10^{6} (Parameter 101)
- kVAh x 10^{3} (Parameter 102)
- kVAh x 10^{0} (Parameter 103)
- kVAh x 10^{-3} (Parameter 104)

Clear Max kW Demand

When the Clear %TCU command is issued, the CEP9 Electronic Overload Relay will set Max kW Demand (Parameter 106) to a value of zero (0).

Clear Max kVAR Demand

When the Clear %TCU command is issued, the CEP9 Electronic Overload Relay will set Max kVAR Demand (Parameter 108) to a value of zero (0).

Clear Max kVA Demand

When the Clear %TCU command is issued, the CEP9 Electronic Overload Relay will set Max kVA Demand (Parameter 110) to a value of zero (0).

Clear All

When the Clear All command is issued, the CEP9 Electronic Overload Relay will set the following parameters to a value of zero (0):

- % Thermal Capacity Utilized (Parameter 1)
- Operating Time (Parameter 28)
- Starts Counter (Parameter 29)
- kWh x 10^{9} (Parameter 80)
- kWh x 10^{6} (Parameter 81)
- kWh x 10^{3} (Parameter 82)
- kWh x 10^{0} (Parameter 83)
- kWh x 10^{-3} (Parameter 84)
- kVARh Consumed x 10^{9} (Parameter 85)
- kVARh Consumed x 10^{6} (Parameter 86)

- kVARh Consumed x 10^{3} (Parameter 87)
- kVARh Consumed x 10^{0} (Parameter 88)
- kVARh Consumed x 10^{-3} (Parameter 89)
- kVARh Generated x 10^{9} (Parameter 90)
- kVARh Generated x 10^{6} (Parameter 91)
- kVARh Generated x 10^{3} (Parameter 92)
- kVARh Generated x 10^{0} (Parameter 93)
- kVARh Generated x 10^{-3} (Parameter 94)
- kVARh Net x 10^{9} (Parameter 95)
- kVARh Net x 10^{6} (Parameter 96)
- kVARh Net x 10^{3} (Parameter 97)
- kVARh Net x 10^{0} (Parameter 98)
- kVARh Net x 10^{-3} (Parameter 99)
- kVAh x 10^{9} (Parameter 100)
- kVAh x 10^{6} (Parameter 101)
- kVAh x 10^{3} (Parameter 102)
- kVAh x 10^{0} (Parameter 103)
- kVAh x 10^{-3} (Parameter 104)
- Max kW Demand (Parameter 106)
- Max kVAR Demand (Parameter 108)
- Max kVA Demand (Parameter 110)
- Trip History 0 (Parameter 127)
- Trip History 1 (Parameter 128)
- Trip History 2 (Parameter 129)
- Trip History 3 (Parameter 130)
- Trip History 4 (Parameter 131)
- Warning History 0 (Parameter 132)
- Warning History 1 (Parameter 133)
- Warning History 2 (Parameter 134)
- Warning History 3 (Parameter 135)
- Warning History 4 (Parameter 136)

Notes:

Metering and Diagnostics

Introduction

The purpose of this chapter is to provide detailed information regarding the metering and diagnostic information that the CEP9 Electronic Overload Relay generates. The metering and diagnostic functions are organized into seven sections:

- Device Monitor
- Current Monitor
- Voltage Monitor
- Power Monitor
- Energy Monitor
- Trip/Warning History
- Trip Snapshot

Device Monitor

The CEP9 Electronic Overload Relay's device monitor diagnostics provides information on the status of the CEP9 Electronic Overload Relay which includes:

- Thermal overload protection
- Trip and warning protection functions
- Digital inputs and relay outputs
- Operator station
- Hardware options
- Time and date

Percent Thermal Capacity Utilized

Percent Thermal Capacity Utilized (Parameter 1) reports the calculated percent thermal capacity utilization of the motor being monitored. When the percent thermal capacity utilization equals 100%, the CEP9 Electronic Overload Relay will issue an overload trip.

Table 209 - Percent Thermal Capacity Utilization (Parameter 1)

Default Value	0
Minimum Value	0
Maximum Value	100
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	%

Time to Trip

When the measured motor current exceeds the trip rating of the CEP9 Electronic Overload Relay, Overload Time to Trip (Parameter 2) indicates the estimated time remaining before an overload trip occurs. When the measured current is below the trip rating, the Overload Time to Trip value is reported as 9,999 seconds.

Table 210 - Overload Time to Trip (Parameter 2)

Default Value	9999
Minimum Value	0
Maximum Value	9999
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Sec

Time To Reset

After an overload trip, the CEP9 Electronic Overload Relay will report the time remaining until the device can be reset through Overload Time to Reset (Parameter 3). When the % Thermal Capacity Utilized value falls to or below the Overload Reset Level (Parameter 174), the Overload Time to Reset value will indicate zero until the overload trip is reset. After an overload trip is reset, the Overload Time to Reset value is reported as 0 seconds.

Table 211 - Overload Time to Reset (Parameter 3)

Default Value	0
Minimum Value	0
Maximum Value	9999
Parameter Type	UINT

Current Trip Status

Current Trip Status (Parameter 4) reports the status of the current based protective trip functions.

Table 212 - Current Trip Status (Parameter 4)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Trip
														X		Phase Loss Trip
													X			Ground Fault Current Trip
												X				Stall Trip
											X					Jam Trip
										X						Underload Trip
									X							Current Imbalance Trip
								X								L1 Under Current Trip
							X									L2 Under Current Trip
						X										L3 Under Current Trip
					X											L1 Over Current Trip
				X												L2 Over Current Trip
			X													L3 Over Current Trip
		X														L1 Line Loss Trip
	X															L2 Line Loss Trip
X																L3 Line Loss Trip

Voltage Trip Status

Voltage Trip Status (Parameter 5) reports the status of the voltage-based protective trip functions.

Table 213 - Voltage Trip Status (Parameter 5)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Trip
														X		Over Voltage Trip
													X			Voltage Imbalance Trip
												X				Phase Rotation Mismatch Trip
											X					Under Frequency Trip
										X						Over Frequency Trip
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Power Trip Status

Power Trip Status (Parameter 6) reports the status of the voltage-based protective trip functions.

Table 214 - Power Trip Status (Parameter 6)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Trip
														X		Over kW Trip
													X			Under kVAR Consumed Trip
												X				Over kVAR Consumed Trip
											X					Under kVAR Generated Trip
										X						Over kVAR Generated Trip
									X							Under kVA Trip
								X								Over kVA Trip
							X									Under PF Lagging Trip
						X										Over PF Lagging Trip
					X											Under PF Leading Trip
				X												Over PF Leading Trip
																Reserved
																Reserved
																Reserved
																Reserved

Control Trip Status

Control Trip Status (Parameter 7) reports the status of the control based protective trip functions.

Table 215 - Control Trip Status (Parameter 7)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Test Trip
														X		PTC Trip
													X			DeviceLogix Trip
												X				Operator Station Trip
											X					Remote Trip
										X						Blocked Start Trip
									X							Hardware Fault Trip
								X								Configuration Trip
							X									Option Match Trip
						X										Feedback Timeout Trip
					X											Expansion Bus Trip
																Reserved
																Reserved
		X														Non-Volatile Memory Trip
	X															Test Mode Trip Enable
																Reserved

Current Warning Status

Current Warning Status (Parameter 10) reports the status of the current based protective warning functions.

Table 216 - Current Warning Status (Parameter 10)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Warning
																Reserved
													X			Ground Fault Warning
																Reserved
											X					Jam Warning
										X						Underload Warning
									X							Current Imbalance Warning
								X								L1 Under Current Warning
							X									L2 Under Current Warning
						X										L3 Under Current Warning
					X											L1 Over Current Warning
				X												L2 Over Current Warning
			X													L3 Over Current Warning
		X														L1 Line Loss Warning
	X															L2 Line Loss Warning
X																L3 Line Loss Warning

Voltage Warning Status

Voltage Warning Status (Parameter 11) reports the status of the control based protective warning functions.

Table 217 - Voltage Warning Status (Parameter 11)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Warning
														X		Over Voltage Warning
													X			Voltage Imbalance Warning
												X				Phase Rotation Mismatch Warning
											X					Under Frequency Warning
										X						Over Frequency Warning
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Power Warning Status

Power Warning Status (Parameter 12) reports the status of the control based protective warning functions.

Table 218 - Power Warning Status (Parameter 12)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Warning
														X		Over kW Warning
													X			Under kVAR Consumed Warning
												X				Over kVAR Consumed Warning
											X					Under kVAR Generated Warning
										X						Over kVAR Generated Warning
									X							Under kVA Warning
								X								Over kVA Warning
							X									Under PF Lagging Warning
						X										Over PF Lagging Warning
					X											Under PF Leading Warning
				X												Over PF Leading Warning
																Reserved
																Reserved
																Reserved
																Reserved

Control Warning Status

Control Warning Status (Parameter 13) reports the status of the control based protective warning functions.

Table 219 - Control Warning Status (Parameter 13)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
																Reserved
														X		PTC Warning
													X			DeviceLogix Warning
												X				Operator Station Warning
																Reserved
																Reserved
																Reserved
																Reserved
							X									Option Match Warning
						X										Feedback Timeout Warning
					X											Expansion Bus Warning
				X												Number Of Starts Warning
			X													Operating Hours Warning
																Reserved
																Reserved
																Reserved

Input Status 0

Input Status 0 (Parameter 16) reports the state of the digital inputs on the CEP9 Electronic Overload Relay Control Module.

Table 220 - Input Status 0 (Parameter 16)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Input Pt00
														X		Input Pt01
													X			Input Pt02
												X				Input Pt03
											X					Input Pt04
										X						Input Pt05
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Input Status 1

Input Status 1 (Parameter 17) reports the state of the digital inputs on the CEP9 Electronic Overload Relay Digital Expansion Modules.

Table 221 - Input Status 1 (Parameter 17)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Digital Module 1 Input Pt00
														X		Digital Module 1 Input Pt01
													X			Digital Module 1 Input Pt02
												X				Digital Module 1 Input Pt03
											X					Digital Module 2 Input Pt00
										X						Digital Module 2 Input Pt01
									X							Digital Module 2 Input Pt02
								X								Digital Module 2 Input Pt03
							X									Digital Module 3 Input Pt00
						X										Digital Module 3 Input Pt01
					X											Digital Module 3 Input Pt02
				X												Digital Module 3 Input Pt03
			X													Digital Module 4 Input Pt00
		X														Digital Module 4 Input Pt01
	X															Digital Module 4 Input Pt02
X																Digital Module 4 Input Pt03

Output Status

Output Status (Parameter 18) reports the state of the relay outputs on the CEP9 Electronic Overload Relay Control Module and Digital Expansion Modules.

Table 222 - Output Status (Parameter 18)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Output Pt00
														X		Output Pt01
													X			Output Pt02
												X				Digital Module 1 Output Pt00
											X					Digital Module 1 Output Pt01
										X						Digital Module 2 Output Pt00
									X							Digital Module 2 Output Pt01
								X								Digital Module 3 Output Pt00
							X									Digital Module 3 Output Pt01
						X										Digital Module 4 Output Pt00
					X											Digital Module 4 Output Pt01
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Operator Station Status

Operator Station Status (Parameter 19) reports the state of the CEP9 Electronic Overload Relay Operator Station input buttons and output LEDs.

Table 223 - Operator Station Status (Parameter 19)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Operation Station I
														X		Operation Station II
													X			Operation Station Local Remote
												X				Operation Station O
											X					Operation Station Reset
																Reserved
																Reserved
																Reserved
							X									Operation Station I LED
						X										Operation Station II LED
					X											Operation Station Local LED
				X												Operation Station Remote LED
			X													Operation Station O LED
																Reserved
																Reserved
																Reserved

Device Status 0

Device Status 0 (Parameter 20) reports the general status of the CEP9 Electronic Overload Relay and the sensing capabilities that are present.

Table 224 - Device Status 0 (Parameter 20)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Trip Present
														X		Warning Present
													X			Invalid Configuration
												X				Current Present
											X					Ground Fault Current Present
										X						Voltage Present
									X							Emergency Start Enabled
								X								DeviceLogix Enabled
							X									Feedback Timeout Enabled
						X										Operator Station Present
					X											Voltage Sensing Present
				X												Internal Ground Fault Sensing Present
			X													External Ground Fault Sensing Present
		X														PTC Sensing Present
	X															Ready
																Reserved

Device Status 0 bit 14, "Ready", is cleared under the following circumstances:

- Device Status 0 bit 0, "Trip Present", is set
- The CEP9 Electronic Overload Relay has not completed its power up initialization
- The processing of data in a configuration assembly is in progress
- A CopyCat function is in progress
- A Factory Defaults command has been invoked and is in progress.

Device Status 1

Device Status 1 (Parameter 21) reports the specific features of the CEP9 Electronic Overload Relay Control and Sensing Modules, it reports which Expansion Digital Modules Analog Modules are present on the CEP9 Electronic Overload Relay Expansion Bus.

Table 225 - Device Status 1 (Parameter 21)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	24V DC Control Module Present
														X		120V AC Control Module Present
													X			240V AC Control Module Present
												X				0.5…30 A Sensing Module Present
											X					6…60 A Sensing Module Present
										X						10…100 A Sensing Module Present
									X							20…2000 A Sensing Module Present
								X								Digital Module 1 Present
							X									Digital Module 2 Present
						X										Digital Module 3 Present
					X											Digital Module 4 Present
				X												Analog Module 1 Present
			X													Analog Module 2 Present
		X														Analog Module 3 Present
	X															Analog Module 4 Present
																Reserved

Firmware Revision Number

Firmware Revision Number (Parameter 22) reports the firmware revision number of the CEP9 Electronic Overload Relay system.

Table 226 - Firmware Revision Number (Parameter 22)

Default Value	0.000
Minimum Value	0.000
Maximum Value	65.535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1000
Units	

Control Module ID

Control Module ID (Parameter 23) identifies which specific Control Module is present in the CEP9 Electronic Overload Relay system.

Table 227 - Control Module ID (Parameter 23)

Default Value	0
Range	0 = Unknown 1 = CEP9-EIO-63-24D 2 = CEP9-EIO-43-120 3 = CEP9-EIO-43-240 4 = CEP9-EIOGP-42-24D 5 = CEP9-EIOGP-22-120 6 = CEP9-EIOGP-22-240
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Sensing Module ID

Sensing Module ID (Parameter 24) identifies which specific Sensing Module is present in the CEP9 Electronic Overload Relay system.

Table 228 - Sensing Module ID (Parameter 24)

Default Value	0
Range	0 = Unknown 1 = CEP9-EIO-VIG-30A-___ 2 = CEP9-EIO-VIG-60A-___ 3 = CEP9-EIO-VIG-100A-___ 4 = CEP9-EIO-VIG-200A-___ 5 = CEP9-EIO-IG-30A-___ 6 = CEP9-EIO-IG-60A-___ 7 = CEP9-EIO-IG-100A-___ 8 = CEP9-EIO-IG-200A-___ 9 = CEP9-EIO-I-30A-___ 10 = CEP9-EIO-I-60A-___ 11 = CEP9-EIO-I-100A-___ 12 = CEP9-EIO-I-200A-___
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Operator Station ID

Operator Station ID (Parameter 25) identifies which specific Operator Station is present on the Expansion Bus of the CEP9 Electronic Overload Relay system.

Table 229 - Operator Station ID (Parameter 25)

Default Value	0
Range	0 = Unknown 1 = None 2 = CEP9-EOS-SCS 3 = CEP9-EOS-SDS
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Expansion Digital Module ID

Expansion Digital Module ID (Parameter 26) identifies which specific Expansion Digital Modules are present on the Expansion Bus of the CEP9 Electronic Overload Relay system.

Table 230 - Expansion Digital Module ID (Parameter 26)

Bit																Function	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
													0	0	0	None	Digital Module 1
													0	1	0	CEP9-EXP-DIO-42-24D	
													0	1	1	CEP9-EXP-DIO-42-120	
													1	0	0	CEP9-EXP-DIO-42-240	
										0	0	0				None	Digital Module 2
										0	1	0				CEP9-EXP-DIO-42-24D	
										0	1	1				CEP9-EXP-DIO-42-120	
										1	0	0				CEP9-EXP-DIO-42-240	
							0	0	0							None	Digital Module 3
							0	1	0							CEP9-EXP-DIO-42-24D	
							0	1	1							CEP9-EXP-DIO-42-120	
							1	0	0							CEP9-EXP-DIO-42-240	
				0	0	0										None	Digital Module 4
				0	1	0										CEP9-EXP-DIO-42-24D	
				0	1	1										CEP9-EXP-DIO-42-120	
				1	0	0										CEP9-EXP-DIO-42-240	

Operating Time

Operating Time (Parameter 28) represents the number hours that a motor has been running. This value can be reset to zero using the Clear Command (Parameter 165) function Clear Operating Statistics.

Table 231 - Operating Time (Parameter 28)

Default Value	0
Minimum Value	0
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Hours

Starts Counter

Starts Counter (Parameter 29) represents the number of times a motor has been started. This value can be reset to zero using the Clear Command (Parameter 165) function Clear Operating Statistics.

Table 232 - Starts Counter (Parameter 29)

Default Value	0
Minimum Value	0
Maximum Value	65535
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Starts Available

Starts Available (Parameter 30) reports the number of starts currently available based on the blocked start settings and the actual motor starting events.

Table 233 - Starts Available (Parameter 30)

Default Value	0
Minimum Value	0
Maximum Value	120
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Time to Start

Time to Start (Parameter 31) reports the amount of time remaining until a new start can be issued. If the Time to Start time has elapsed, this parameter will report zero until the next Blocked Start trip occurs.

Table 234 - Time to Start (Parameter 31)

Default Value	0
Minimum Value	0
Maximum Value	3600
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	Sec

Year

Year (Parameter 32) reports the year in the virtual real-time clock of the CEP9 Electronic Overload Relay.

Table 235 - Year (Parameter 32)

Default Value	0
Minimum Value	0
Maximum Value	12
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Month

Month (Parameter 33) reports the month in the virtual real-time clock of the CEP9 Electronic Overload Relay.

Table 236 - Month (Parameter 33)

Default Value	0
Minimum Value	0
Maximum Value	12
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Day

Day (Parameter 34) reports the day in the virtual real-time clock of the CEP9 Electronic Overload Relay.

Table 237 - Day (Parameter 34)

Default Value	0
Minimum Value	0
Maximum Value	31
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Hour

Hour (Parameter 35) reports the hour in the virtual real-time clock of the CEP9 Electronic Overload Relay.

Table 238 - Hour (Parameter 35)

Default Value	0
Minimum Value	0
Maximum Value	24
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Minute

Minute (Parameter 36) reports the minute in the virtual real-time clock of the CEP9 Electronic Overload Relay.

Table 239 - Minute (Parameter 36)

Default Value	0
Minimum Value	0
Maximum Value	60
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Second

Second (Parameter 37) reports the second in the virtual real-time clock of the CEP9 Electronic Overload Relay.

Table 240 - Second (Parameter 37)

Default Value	0
Minimum Value	0
Maximum Value	60
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Invalid Configuration Parameter

Invalid Configuration Parameter (Parameter 38) reports the parameter number that is causing a configuration trip in the CEP9 Electronic Overload Relay. Refer to Chapter 3 for more information regarding a configuration fault.

Table 241 - Invalid Configuration Parameter (Parameter 38)

Default Value	0
Minimum Value	0
Maximum Value	9999
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	

Invalid Configuration Cause

Invalid Configuration Cause (Parameter 39) reports the reason for the configuration trip in the CEP9 Electronic Overload Relay. Refer to Chapter 3 for more information regarding a configuration fault.

Table 242 - Invalid Configuration Cause (Parameter 39)

Default Value	0
Range	0 = No Error 1 = Value Over Maximum 2 = Value Under Minimum 3 = Illegal Value 4 = L3 Current Detected 5 = CopyCat Error
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Mismatch Status

Mismatch Status (Parameter 40) reports the module that is causing a mismatch trip or warning in the CEP9 Electronic Overload Relay. Refer to Chapter 3 for more information on a mismatch fault.

Table 243 - Mismatch Status (Parameter 40)

Bit																Function	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
															0	Match	Control Module
															1	Mismatch	
														0		Match	Sensing Module
														1		Mismatch	
													0			Match	Communication Module
													1			Mismatch	
												0				Match	Operator Station
												1				Mismatch	
											0					Match	Digital Module 1
											1					Mismatch	
										0						Match	Digital Module 2
										1						Mismatch	
									0							Match	Digital Module 3
									1							Mismatch	
								0								Match	Digital Module 4
								1								Mismatch	
							0									Match	Analog Module 1
							1									Mismatch	
						0										Match	Analog Module 2
						1										Mismatch	
					0											Match	Analog Module 3
					1											Mismatch	
				0												Match	Analog Module 4
				1												Mismatch	

Current Monitor

The CEP9 Electronic Overload Relay current monitor diagnostics provides information on the current consumed by the load that the CEP9 Electronic Overload Relay is monitoring, and it provides diagnostics for a three phase current system including imbalance and ground fault current.

L1 Current

L1 Current (Parameter 43) reports the current in Amperes flowing through the L1 and T1 power terminals of the CEP9 Electronic Overload Relay Sensing Module.

Table 244 - L1 Current (Parameter 43)

Default Value	0.00
Minimum Value	0.00
Maximum Value	20000000.00
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	100
Units	Amps

L2 Current

L2 Current (Parameter 44) reports the current in Amperes flowing through the L2 and T2 power terminals of the CEP9 Electronic Overload Relay Sensing Module.

Table 245 - L2 Current (Parameter 44)

Default Value	0.00
Minimum Value	0.00
Maximum Value	20000000.00
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	100
Units	Amps

L3 Current

L3 Current (Parameter 45) reports the current in Amperes flowing through the L3 and T3 power terminals of the CEP9 Electronic Overload Relay Sensing Module.

Table 246 - L3 Current (Parameter 45)

Default Value	0.00
Minimum Value	0.00
Maximum Value	20000000.00
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	100
Units	Amps

Average Current

Average Current (Parameter 46) reports the average current of the monitored current. When single or three phase (Parameter 176) is set to three phase, average current is calculated as follows:
Average Current = (L1 Current + L2 Current + L3 Current) / 3

When single or three phase (Parameter 176) is set to single phase, average current is calculated as follows:
Average Current = (L1 Current + L2 Current) / 2

Table 247 - Average Current (Parameter 46)

Default Value	0.00
Minimum Value	0.00
Maximum Value	20000000.00
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	100
Units	Amps

L1 Percent FLA

L1 Percent FLA (Parameter 47) reports the L1 current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177).
L1 Percent FLA = L1 Current / Full Load Amps

Table 248 - L1 Percent FLA (Parameter 47)

Default Value	0.0
Minimum Value	0.0
Maximum Value	1000.00
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	%

L2 Percent FLA

L2 Percent FLA (Parameter 48) reports the L2 current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177).
L2 Percent FLA = L2 Current / Full Load Amps

Table 249 - L2 Percent FLA (Parameter 48)

Default Value	0.0
Minimum Value	0.0
Maximum Value	1000.00
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	%

L3 Percent FLA

L3 Percent FLA (Parameter 49) reports the L3 current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177).
L3 Percent FLA = L3 Current / Full Load Amps

Table 250 - L3 Percent FLA (Parameter 49)

Default Value	0.0
Minimum Value	0.0
Maximum Value	1000.00
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	%

Average Percent FLA

Average Percent FLA (Parameter 50) reports the average current in comparison to the active Full Load Amps programmed in FLA (Parameter 171) and FLA2 (Parameter 177).
Average Percent FLA = Average Current / Full Load Amps

Table 251 - Average Percent FLA (Parameter 50)

Default Value	0.0
Minimum Value	0.0
Maximum Value	1000.00
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	%

Ground Fault Current

Ground Fault Current (Parameter 51) reports the ground fault current measured by the internal core balanced current transformer of the CEP9 Electronic Overload Relay Sensing Module or external core balanced current transformer.

Table 252 - Ground Fault Current (Parameter 51)

Default Value	0.0
Minimum Value	0.0
Maximum Value	99.99
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	100
Units	Amps

Current Imbalance

Current Imbalance (Parameter 52) reports the percentage of uneven current consumption in the monitored power system. Current Imbalance is defined by the following equation:
*Current Imbalance = 100% * (Id/Ia)*
where
I_d = *Maximum Line Current Deviation from the Average Current*
I_a = *Average Current*

Table 253 - Current Imbalance (Parameter 52)

Default Value	0
Minimum Value	0
Maximum Value	200
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	%

Voltage Monitor

The CEP9 Electronic Overload Relay's voltage monitor diagnostics provides information on the voltage being supplied to the load. The voltage diagnostics include three phase voltage, phase imbalance, phase rotation, and frequency.

L1-L2 Voltage

L1-L2 Voltage (Parameter 53) reports the voltage in volts in reference to the T1 and T2 power terminals of the CEP9 Electronic Overload Relay Sensing Module.

Table 254 - L1-L2 Voltage (Parameter 53)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

L2-L3 Voltage

L2-L3 Voltage (Parameter 54) reports the voltage in volts in reference to the T2 and T3 power terminals of the CEP9 Electronic Overload Relay Sensing Module.

Table 255 - L2-L3 Voltage (Parameter 54)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

Table 256 - L3-L1 Voltage

L3-L1 Voltage (Parameter 55) reports the voltage in volts in reference to the T3 and T1 power terminals of the CEP9 Electronic Overload Relay Sensing Module.

Table 257 - L3-L1 Voltage (Parameter 55)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

Average L-L Voltage

Average L-L Voltage (Parameter 56) reports the average voltage of the monitored L-L voltages. When Single or Three Phase (Parameter 176) is set to *Three Phase*, Average L-L Voltage is calculated as follows:

Average L-L Voltage = (L1-L2 Voltage + L2-L3 Voltage + L3-L1 Voltage) / 3

When Single or Three Phase (Parameter 176) is set to *Single Phase*, Average L-L Voltage is calculated as follows:

Average L-L Voltage = (L1-L2 Voltage + L2-L3 Voltage) / 2

Table 258 - Average L-L Voltage (Parameter 56)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

L1-N Voltage

L1-N Voltage (Parameter 57) reports the voltage in volts in reference to the T1 power terminal of the CEP9 Electronic Overload Relay Sensing Module.

Table 259 - L1-N Voltage (Parameter 57)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

L2-N Voltage

L2-N Voltage (Parameter 58) reports the voltage in volts in reference to the T2 power terminal of the CEP9 Electronic Overload Relay Sensing Module.

Table 260 - L2-N Voltage (Parameter 58)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

L3-N Voltage

L3-N Voltage (Parameter 59) reports the voltage in volts in reference to the T3 power terminal of the CEP9 Electronic Overload Relay Sensing Module.

Table 261 - L3-N Voltage (Parameter 59)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

Average L-N Voltage

Average L-N Voltage (Parameter 60) reports the average voltage of the monitored L-N voltages. When Single or Three Phase (Parameter 176) is set to *Three Phase*, Average L-N Voltage is calculated as follows:

Average L-N Voltage = (L1-N Voltage + L2-N Voltage + L3-N Voltage) / 3

When Single or Three Phase (Parameter 176) is set to *Single Phase*, Average L-N Voltage is calculated as follows:

Average L-N Voltage = (L1-N Voltage + L2-N Voltage) / 2

Table 262 - Average L-N Voltage (Parameter 60)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

Voltage Imbalance

Voltage Imbalance (Parameter 61) reports the percentage of uneven voltage being supplied by the monitored power system. Voltage Imbalance is defined by the following equation:

*Voltage Imbalance = 100% * (Vd/Va)*

where

Vd = Maximum L-L Voltage Deviation from the Average L-L Voltage

Va = Average L-L Voltage

Table 263 - Voltage Imbalance (Parameter 61)

Default Value	0
Minimum Value	0
Maximum Value	200
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	1
Units	%

Frequency

Frequency (Parameter 62) reports the voltage frequency in Hertz of the monitored power system from the CEP9 Electronic Overload Relay Sensing Module.

Table 264 - Frequency (Parameter 62)

Default Value	0.0
Minimum Value	0.0
Maximum Value	74.0
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Hz

Phase Rotation

Phase Rotation (Parameter 63) reports the voltage phase rotation as ABC or ACB of the monitored power system from the CEP9 Electronic Overload Relay Sensing Module.

Table 265 - Phase Rotation Trip Type (Parameter 63)

Default Value	0 = No Rotation
Range	0 = No Rotation 1 = ABC 2 = ACB
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

Power Monitor

The CEP9 Electronic Overload Relay's power monitor diagnostics provides information on the power being supplied to the load. The power diagnostics include real power (kW), reactive power (kVAR), apparent power (kVA), and power factor.

Power Scale

For large medium voltage based power systems, it may be more convenient for the user to view the real-time power information (Parameters 64-75) in terms of Megawatts instead of Kilowatts. Power Scale (Parameter 377) allows the CEP9 Electronic Overload Relay to display the values of Parameters 64-75 as Kilowatts or Megawatts.

Table 266 - Power Scale (Parameter 377)

Default Value	0 = Kilowatts
Range	0 = Kilowatts 1 = Megawatts
Parameter Type	USINT
Size (Bytes)	1
Scaling Factor	1
Units	

L1 Real Power

L1 Real Power (Parameter 64) reports the real power for line 1 in kW or MW depending on the configuration value for Power Scale (Parameter 377). When

Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Real Power is set to 0.

Table 267 - L1 Real Power (Parameter 64)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW or MW

L2 Real Power

L2 Real Power (Parameter 65) reports the real power for line 2 in kW or MW depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Real Power is set to 0.

Table 268 - L2 Real Power (Parameter 65)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW or MW

L3 Real Power

L3 Real Power (Parameter 66) reports the real power for line 3 in kW or MW depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Real Power is set to 0. When Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 Real Power is set to 0.

Table 269 - L3 Real Power (Parameter 66)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW or MW

Total Real Power

Total Real Power (Parameter 67) reports the total real power of the monitored power conductors in kW or MW depending on the configuration value for Power Scale (Parameter 377). When Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Real Power is calculated as follows:

Total Real Power = (L1 Real Power + L2 Real Power + L3 Real Power)

When Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Real Power is calculated as follows:

Total Real Power = (L1 Real Power + L2 Real Power)

Table 270 - Total Real Power (Parameter 67)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW or MW

L1 Reactive Power

L1 Reactive Power (Parameter 68) reports the reactive power for line 1 in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Reactive Power is set to 0.

Table 271 - L1 Reactive Power (Parameter 68)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR or MVAR

L2 Reactive Power

L2 Reactive Power (Parameter 69) reports the reactive power for line 2 in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Reactive Power is set to 0.

Table 272 - L2 Reactive Power (Parameter 69)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR or MVAR

L3 Reactive Power

L3 Reactive Power (Parameter 70) reports the reactive power for line 3 in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Reactive Power is set to 0. When Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 Reactive Power is set to 0.

Table 273 - L3 Reactive Power (Parameter 70)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR or MVAR

Total Reactive Power

Total Reactive Power (Parameter 71) reports the total Reactive power of the monitored power conductors in kVAR or MVAR depending on the configuration value for Power Scale (Parameter 377). When Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Reactive Power is calculated as follows:

Total Reactive Power = (L1 Reactive Power + L2 Reactive Power + L3 Reactive Power)

When Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Reactive Power is calculated as follows:

Total Reactive Power = (L1 Reactive Power + L2 Reactive Power)

Table 274 - Total Reactive Power (Parameter 71)

Default Value	0.000c
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR or MVAR

L1 Apparent Power

L1 Apparent Power (Parameter 72) reports the apparent power for line 1 in kVA or MVA depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Apparent Power is set to 0.

Table 275 - L1 Apparent Power (Parameter 72)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA or MVA

L2 Apparent Power

L2 Apparent Power (Parameter 73) reports the apparent power for line 2 in kVA or MVA depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Apparent Power is set to 0.

Table 276 - L2 Apparent Power (Parameter 73)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA or MVA

L3 Apparent Power

L3 Apparent Power (Parameter 74) reports the apparent power for line 3 in kVA or MVA depending on the configuration value for Power Scale (Parameter 377). When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Apparent Power is set to 0. When Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 Apparent Power is set to 0.

Table 277 - L3 Apparent Power (Parameter 74)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA or MVA

Total Apparent Power

Total Apparent Power (Parameter 75) reports the total apparent power of the monitored power conductors in kVA or MVA depending on the configuration value for Power Scale (Parameter 377). When Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Apparent Power is calculated as follows:

Total Apparent Power = (L1 Apparent Power + L2 Apparent Power + L3 Apparent Power)

When Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Apparent Power is calculated as follows:

Total Apparent Power = (L1 Apparent Power + L2 Apparent Power)

Table 278 - Total Apparent Power (Parameter 75)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA or MVA

L1 Power Factor

L1 Power Factor (Parameter 76) reports the power factor for line 1 in percentage. When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L1 Power Factor is set to 0.

Table 279 - L1 Power Factor (Parameter 76)

Default Value	0.0
Minimum Value	-100.0
Maximum Value	100.0
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	10
Units	%

L2 Power Factor Power

L2 Power Factor (Parameter 77) reports the power factor for line 2 in percentage. When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L2 Power Factor is set to 0.

Table 280 - L2 Power Factor (Parameter 77)

Default Value	0.0
Minimum Value	-100.0
Maximum Value	100.0
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	10
Units	%

L3 Power Factor

L3 Power Factor (Parameter 78) reports the power factor for line 3 in percentage. When Voltage Mode (Parameter 352) is set to any *Delta* base setting, L3 Power Factor is set to 0. When Single or Three Phase (Parameter 176) is set to *Single Phase*, L3 power factor is set to 0.

Table 281 - L3 Power Factor (Parameter 78)

Default Value	0.0
Minimum Value	-100.0
Maximum Value	100.0
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	10
Units	%

Total Power Factor

Total Power Factor (Parameter 79) reports the total power factor of the monitored power conductors in percentage. When Single or Three Phase (Parameter 176) is set to *Three Phase*, Total Power Factor is calculated as follows:

Total Power Factor = (L1 Power Factor + L2 Power Factor + L3 Power Factor) / 3

When Single or Three Phase (Parameter 176) is set to *Single Phase*, Total Power Factor is calculated as follows:

Total Power Factor = (L1 Power Factor + L2 Power Factor) / 2

Table 282 - Total Power Factor (Parameter 79)

Default Value	0.0
Minimum Value	-100.0
Maximum Value	100.0
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	10
Units	%

Energy Monitor

The CEP9 Electronic Overload Relay's energy monitor diagnostics provides information on the electrical energy being consumed by the load. The energy diagnostics include kWh, kVARh, kVAh, kW Demand, kVAR Demand, and kVA Demand.

kWh 10^9

kWh 10^9 (Parameter 80) reports a component of total real energy (kWh). Multiply this value by 10^9 and add to the other kWh parameters.
Represents **XXX**,*000,000,000.000* kWh

Table 283 - kWh x 10E9 (Parameter 80)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kWh 10^6

kWh 10^6 (Parameter 81) reports a component of total real energy (kWh). Multiply this value by 10^6 and add to the other kWh parameters.
Represents *000,***XXX***,000,000.000* kWh

Table 284 - kWh x 10E6 (Parameter 81)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kWh 10^3

kWh 10^3 (Parameter 82) reports a component of total real energy (kWh). Multiply this value by 10^3 and add to the other kWh parameters.
Represents *000,000,***XXX***,000.000* kWh

Table 285 - kWh x 10E3 (Parameter 82)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kWh 10^0

kWh 10^0 (Parameter 83) reports a component of total real energy (kWh). Multiply this value by 10^0 and add to the other kWh parameters.

Represents *000,000,000,***XXX***.000* kWh

Table 286 - kWh x 10E0 (Parameter 83)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kWh 10^{-3}

kWh 10^{-3} (Parameter 84) reports a component of total real energy (kWh). Multiply this value by 10^{-3} and add to the other kWh parameters.
Represents *000,000,000,000.* **XXX** kWh

Table 287 - kWh x 10E-3 (Parameter 84)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Consumed 10^{9}

kVARh Consumed 10^{9} (Parameter 85) reports a component of total reactive energy consumed (kVARh). Multiply this value by 10^{9} and add to the other kVARh Consumed parameters.
Represents **XXX**,*000,000,000.000* kVARh

Table 288 - kVARh Consumed x 10E9 (Parameter 85)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Consumed 10^6

kVARh Consumed 10^6 (Parameter 86) reports a component of total reactive energy consumed (kVARh). Multiply this value by 10^6 and add to the other kVARh Consumed parameters.

Represents *000,***XXX***,000,000.000* kVARh

Table 289 - kVARh Consumed x 10E6 (Parameter 86)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Consumed 10^3

kVARh Consumed 10^3 (Parameter 87) reports a component of total reactive energy consumed (kVARh). Multiply this value by 10^3 and add to the other kVARh Consumed parameters.

Represents *000,000,***XXX***,000.000* kVARh

Table 290 - kVARh Consumed x 10E3 (Parameter 87)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Consumed 10^0

kVARh Consumed 10^0 (Parameter 88) reports a component of total reactive energy consumed (kVARh). Multiply this value by 10^0 and add to the other kVARh Consumed parameters.

Represents *000,000,000,***XXX***.000* kVARh

Table 291 - kVARh Consumed x 10E0 (Parameter 88)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Consumed 10^{-3}

kVARh Consumed 10^{-3} (Parameter 89) reports a component of total reactive energy consumed (kVARh). Multiply this value by 10^{-3} and add to the other kVARh Consumed parameters.

Represents *000,000,000,000.* **XXX** kVARh

Table 292 - kVARh Consumed x 10E-3 (Parameter 89)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Generated 10^{9}

kVARh Generated 10^{9} (Parameter 90) reports a component of total reactive energy generated (kVARh). Multiply this value by 10^{9} and add to the other kVARh Generated parameters.

Represents **XXX**,*000,000,000.000* kVARh

Table 293 - kVARh Generated x 10E9 (Parameter 90)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Generated 10^6

kVARh Consumed 10^6 (Parameter 91) reports a component of total reactive energy generated (kVARh). Multiply this value by 10^6 and add to the other kVARh Generated parameters.

Represents *000,***XXX***,000,000.000* kVARh

Table 294 - kVARh Generated x 10E6 (Parameter 91)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Generated 10^3

kVARh Generated 10^3 (Parameter 92) reports a component of total reactive energy generated (kVARh). Multiply this value by 10^3 and add to the other kVARh Generated parameters.

Represents *000,000,***XXX***,000.000* kVARh

Table 295 - kVARh Generated x 10E3 (Parameter 92)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Generated 10^0

kVARh Generated 10^0 (Parameter 93) reports a component of total reactive energy generated (kVARh). Multiply this value by 10^0 and add to the other kVARh Generated parameters.

Represents *000,000,000,***XXX***.000* kVARh

Table 296 - kVARh Generated x 10E0 (Parameter 93)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Generated 10^{-3}

kVARh Generated 10^{-3} (Parameter 94) reports a component of total reactive energy generated (kVARh). Multiply this value by 10^{-3} and add to the other kVARh Generated parameters.

Represents *000,000,000,000.* **XXX** kVARh

Table 297 - kVARh Generated x 10E-3 (Parameter 94)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Net 10^{9}

kVARh Net 10^{9} (Parameter 95) reports a component of total reactive energy net (kVARh). Multiply this value by 10^{9} and add to the other kVARh Net parameters.

Represents **XXX**,*000,000,000.000* kVARh

Table 298 - kVARh Net x 10E9 (Parameter 95)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Net 10^6

kVARh Net 10^6 (Parameter 96) reports a component of total reactive energy net (kVARh). Multiply this value by 10^6 and add to the other kVARh Net parameters.

Represents *000,***XXX***,000,000.000* kVARh

Table 299 - kVARh Net x 10E6 (Parameter 96)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Net 10^3

kVARh Net 10^3 (Parameter 97) reports a component of total reactive energy net (kVARh). Multiply this value by 10^3 and add to the other kVARh Net parameters.

Represents *000,000,***XXX***,000.000* kVARh

Table 300 - kVARh Net x 10E3 (Parameter 97)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Net 10^0

kVARh Net 10^0 (Parameter 98) reports a component of total reactive energy net (kVARh). Multiply this value by 10^0 and add to the other kVARh Net parameters.

Represents *000,000,000,***XXX***.000* kVARh

Table 301 - kVARh Net x 10E0 (Parameter 98)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVARh Net 10^{-3}

kVARh Net 10^{-3} (Parameter 99) reports a component of total reactive energy net (kVARh). Multiply this value by 10^{-3} and add to the other kVARh Net parameters.

Represents *000,000,000,000.* **XXX** kVARh

Table 302 - kVARh Net x 10E-3 (Parameter 99)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVAh 10^{9}

kVAh 10^{9} (Parameter 100) reports a component of total apparent energy (kVAh). Multiply this value by 10^{9} and add to the other kVAh parameters.

Represents **XXX**,*000,000,000.000* kVAh

Table 303 - kVAh x 10E9 (Parameter 100)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVAh 10^6

kVAh 10^6 (Parameter 101) reports a component of total apparent energy (kVAh). Multiply this value by 10^6 and add to the other kVAh parameters.

Represents *000,***XXX***,000,000.000* kVAh

Table 304 - kVAh x 10E6 (Parameter 101)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVAh 10^3

kVAh 10^3 (Parameter 102) reports a component of total apparent energy (kVAh). Multiply this value by 10^3 and add to the other kVAh parameters.

Represents *000,000,***XXX***,000.000* kVAh

Table 305 - kVAh x 10E3 (Parameter 102)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVAh 10^0

kVAh 10^0 (Parameter 103) reports a component of total apparent energy (kVAh). Multiply this value by 10^0 and add to the other kVAh parameters.

Represents *000,000,000,***XXX***.000* kVAh

Table 306 - kVAh x 10E0 (Parameter 103)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kVAh 10^{-3}

kVAh 10^{-3} (Parameter 104) reports a component of total apparent energy (kVAh). Multiply this value by 10^{-3} and add to the other kVAh parameters.

Represents *000,000,000,000.* **XXX** kVAh

Table 307 - kVAh x 10E-3 (Parameter 104)

Default Value	0
Minimum Value	-999
Maximum Value	999
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	1
Units	

kW Demand

kW Demand (Parameter 105) reports the average real energy usage in kW over a defined period of time.

Table 308 - kW Demand (Parameter 105)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW

Max kW Demand

Max kW Demand (Parameter 106) reports the maximum kW Demand since the last Max kW Demand Reset command.

Table 309 - Max kW Demand (Parameter 106)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW

kVAR Demand

kVAR Demand (Parameter 107) reports the average reactive energy usage in kVAR over a defined period of time.

Table 310 - kVAR Demand (Parameter 107)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

Max kVAR Demand

Max kVAR Demand (Parameter 108) reports the maximum kVAR Demand since the last Max kVAR Demand Reset command.

Table 311 - Max kVAR Demand (Parameter 108)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR

kVA Demand

kVA Demand (Parameter 109) reports the average reactive energy usage in kVA over a defined period of time.

Table 312 - kVA Demand (Parameter 109)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA

Max kVA Demand

Max kVA Demand (Parameter 110) reports the maximum kVA Demand since the last Max kVA Demand Reset command.

Table 313 - Max kVA Demand (Parameter 110)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA

Trip / Warning History

The CEP9 Electronic Overload Relay provides a trip and warning history in which the last five trips and last five warnings are recorded into non-volatile storage. A mask is available to limit which trip and warning events are logged to the history's memory.

Trip History

When the CEP9 Electronic Overload Relay issue a trip, the reason for the trip is recorded into the Trip History. Listed below are the codes that are available for the trip history records.

Table 314 - Trip History Codes

Trip History Code	Description
0	No Fault Conditions Detected

Trip History Code	Description
1	Motor current overload condition
2	Phase current Loss detected in one of the motor phases
3	Power conductor or motor winding is shorting to ground
4	Motor has not reached full speed by the end of Stall Enable Time
5	Motor current has exceed the programmed jam trip level
6	Motor current has fallen below normal operating levels
7	Phase to phase current imbalance detected
8	L1Current was below L1 Undercurrent Level longer than Trip Delay
9	L2Current was below L2 Undercurrent Level longer than Trip Delay
10	L3Current was below L3 Undercurrent Level longer than Trip Delay
11	L1 Current was over L1 Overcurrent Level longer than Trip Delay
12	L2 Current was over L2 Overcurrent Level longer than Trip Delay
13	L3 Current was over L3 Overcurrent Level longer than Trip Delay
14	L1 Current Lost for longer than the L1 Loss Trip Delay
15	L2 Current Lost for longer than the L2 Loss Trip Delay
16	L3 Current Lost for longer than the L3 Loss Trip Delay
17	Line to Line Under-Voltage condition detected
18	Line to Line Over-Voltage condition detected
19	Phase to phase voltage imbalance detected
20	The unit detects the supply voltage phases are rotated
21	Line voltage frequency is below trip level
22	Line voltage frequency has exceeded trip level
25	Sensing Module boot loader failed to load firmware
26	Sensing Module output enable open
27	Sensing Module missing interrupts
28	Sensing Module not calibrated
29	Sensing Module frame type failure
30	Sensing Module flash configuration failure
31	Sensing Module detected an overrun error
32	Sensing Module is not responding
33	Total Real Power(kW)is below trip level
34	Total Real Power(kW)has exceeded trip level
35	Under Total Reactive Power Consumed (+kVAR) condition detected
36	Over Total Reactive Power Consumed (+kVAR) condition detected
37	Under Total Reactive Power Generated (-kVAR) condition detected
38	Over Total Reactive Power Generated (-kVAR) condition detected
39	Total Apparent Power (VA or kVA or MVA) is below trip level
40	Total Apparent Power (VA or kVA or MVA) exceeded trip level
41	Under Total Power Factor Lagging (-PF) condition detected
42	Over Total Power Factor Lagging (-PF) condition detected
43	Under Total Power Factor Leading (+PF) condition detected
44	Over Total Power Factor Leading (+PF) condition detected
49	Test trip caused by holding the Test/Reset button for 2 seconds

Trip History Code	Description
50	PTC input indicates that the motor stator windings overheated
51	DeviceLogix defined trip was generated
52	The Stop button the Operator Station was pressed
53	Remote trip command detected
54	Maximum starts per hour exceeded
55	Hardware configuration fault. Check for shorts on input terminal
56	Invalid parameter config. See parameters 38-39 for details
58	DeviceLogix Feedback Timeout Trip was detected
59	Control Module CAN0 initialization failure
60	Control Module CAN0 bus failure
61	Control Module CAN1 initialization failure
62	Control Module CAN1 bus failure
63	Control Module ADC0 failure
64	Control Module detected too many CRC errors
65	Input Channel 00 on Analog Module 1 exceeded its Trip Level
66	Input Channel 01 on Analog Module 1 exceeded its Trip Level
67	Input Channel 02 on Analog Module 1 exceeded its Trip Level
68	Input Channel 00 on Analog Module 2 exceeded its Trip Level
69	Input Channel 01 on Analog Module 2 exceeded its Trip Level
70	Input Channel 02 on Analog Module 2 exceeded its Trip Level
71	Input Channel 00 on Analog Module 3 exceeded its Trip Level
72	Input Channel 01 on Analog Module 3 exceeded its Trip Level
73	Input Channel 02 on Analog Module 3 exceeded its Trip Level
74	Input Channel 00 on Analog Module 4 exceeded its Trip Level
75	Input Channel 01 on Analog Module 4 exceeded its Trip Level
76	Input Channel 02 on Analog Module 4 exceeded its Trip Level
77	External NVS Chip has detected communication timeout error
78	External NVS Chip has detected a CRC error
79	External NVS Chip has detected data out of range
81	Digital Expansion Module 1 is not operating properly
82	Digital Expansion Module 2 is not operating properly
83	Digital Expansion Module 3 is not operating properly
84	Digital Expansion Module 4 is not operating properly
85	Analog Expansion Module 1 is not operating properly
86	Analog Expansion Module 2 is not operating properly
87	Analog Expansion Module 3 is not operating properly
88	Analog Expansion Module 4 is not operating properly
90	Control Module installed does not match the expected type
91	Sensing Module installed does not match the expected type
92	Comms Module installed does not match the expected type
93	Operator Station installed does not match expected type
94	Digital Module installed does not match the expected type
95	Analog Module installed does not match the expected type

Trip History Code	Description
96	Test Mode is engaged and current/voltage was detected
97	Heap memory could not be allocated
98	Vendor ID hardware fault

Trip History Mask

Users can decide which trip events are recorded into the CEP9 Electronic Overload Relay's trip history by using the Trip History Masks.

Current Trip History Mask

Current Trip History Mask (Parameter 139) allows users to select which current based trip events are recorded in the trip history.

Table 315 - Current Trip History Mask (Parameter 139)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Trip
														X		Phase Loss Trip
													X			Ground Fault Trip
												X				Stall Trip
											X					Jam Trip
										X						Underload Trip
									X							Current Imbalance Trip
								X								L1 Under Current Trip
							X									L2 Under Current Trip
						X										L3 Under Current Trip
					X											L1 Over Current Trip
				X												L2 Over Current Trip
			X													L3 Over Current Trip
		X														L1 Line Loss Trip
	X															L2 Line Loss Trip
X																L3 Line Loss Trip

Voltage Trip History Mask

Voltage Trip History Mask (Parameter 140) allows users to select which voltage based trip events are recorded in the trip history.

Table 316 - Voltage Trip History Mask (Parameter 140)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Trip
														X		Over Voltage Trip
													X			Voltage Imbalance Trip
												X				Phase Rotation Trip
											X					Under Frequency Trip
										X						Over Frequency Trip
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Power Trip History Mask

Power Trip History Mask (Parameter 141) allows users to select which power based trip events are recorded in the trip history.

Table 317 - Power Trip History Mask (Parameter 141)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Trip
														X		Over kW Trip
													X			Under kVAR Consumed Trip
												X				Over kVAR Consumed Trip
											X					Under kVAR Generated Trip
										X						Over kVAR Generated Trip
									X							Under kVA Trip
								X								Over kVA Trip
							X									Under Power Factor Lagging Trip
						X										Over Power Factor Lagging Trip
					X											Under Power Factor Leading Trip
				X												Over Power Factor Leading Trip
																Reserved
																Reserved
																Reserved
																Reserved

Control Trip History Mask

Control Trip History Mask (Parameter 142) allows users to select which control based trip events are recorded in the trip history.

Table 318 - Control Trip History Mask (Parameter 142)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Test Trip
														X		PTC Trip
													X			DeviceLogix Trip
												X				Operator Station Trip
											X					Remote Trip
										X						Blocked Start Trip
									X							Hardware Fault Trip
								X								Configuration Trip
							X									Option Match Trip
						X										Feedback Timeout Trip
					X											Expansion Bus Trip
																Reserved
																Reserved
		X														Non-Volatile Memory Trip
	X															Test Mode Trip
																Reserved

Warning History

When the CEP9 Electronic Overload Relay issue a warning, the reason for the warning is recorded into the Warning History. Listed below are the codes that are available for the warning history records.

Table 319 - Warning History Codes

Warning History Code	Description
0	No Warning Conditions Detected
1	Approaching a motor current overload condition
3	Power conductor or motor winding is shorting to ground
5	Motor current has exceed the programmed jam warning level
6	Motor current has fallen below normal operating levels
7	Phase to phase current imbalance detected
8	L1 Current was below L1 Undercurrent Warning Level
9	L2 Current was below L2 Undercurrent Warning Level
10	L3 Current was below L3 Undercurrent Warning Level
11	L1 Current was over L1 Overcurrent Warning Level
12	L2 Current was over L2 Overcurrent Warning Level

Warning History Code	Description
13	L3 Current was over L3 Overcurrent Warning Level
14	L1 Current Lost for longer than the L1 Loss Trip Delay
15	L2 Current Lost for longer than the L2 Loss Trip Delay
16	L3 Current Lost for longer than the L3 Loss Trip Delay
17	Line to Line Under-Voltage condition detected
18	Line to Line Over-Voltage condition detected
19	Phase to phase voltage imbalance detected
20	The unit detects the supply voltage phases are rotated
21	Line voltage frequency is below the warning level
22	Line voltage frequency has exceeded warning level
33	Total Real Power (kW)is below warning level
34	Total Real Power (kW)has exceeded warning level
35	Under Reactive Power Consumed (+kVAR) condition detected
36	Over Reactive Power Consumed (+kVAR) condition detected
37	Under Reactive Power Generated (-kVAR) condition detected
38	Over Reactive Power Generated (-kVAR) condition detected
39	Total Apparent Power (kVA) is below warning level
40	Total Apparent Power (kVA) exceeded warning level
41	Under Total Power Factor Lagging (-PF) condition detected
42	Over Total Power Factor Lagging (-PF) condition detected
43	Under Total Power Factor Leading (+PF) condition detected
44	Over Total Power Factor Leading (+PF) condition detected
50	PTC input indicates that the motor stator windings overheated
51	DeviceLogix defined warning was generated
56	Invalid parameter config. See parameters 38-39 for details
58	DeviceLogix Feedback Timeout Trip was detected
60	Number of Starts Warning Level Exceeded
61	Operating Hours Warning Level Exceeded
65	Input Channel 00 on Analog Module 1 exceeded its Warning Level
66	Input Channel 01 on Analog Module 1 exceeded its Warning Level
67	Input Channel 02 on Analog Module 1 exceeded its Warning Level
68	Input Channel 00 on Analog Module 2 exceeded its Warning Level
69	Input Channel 01 on Analog Module 2 exceeded its Warning Level
70	Input Channel 02 on Analog Module 2 exceeded its Warning Level
71	Input Channel 00 on Analog Module 3 exceeded its Warning Level
72	Input Channel 01 on Analog Module 3 exceeded its Warning Level
73	Input Channel 02 on Analog Module 3 exceeded its Warning Level
74	Input Channel 00 on Analog Module 4 exceeded its Warning Level
75	Input Channel 01 on Analog Module 4 exceeded its Warning Level
76	Input Channel 02 on Analog Module 4 exceeded its Warning Level
81	Digital Expansion Module 1 is not operating properly
82	Digital Expansion Module 2 is not operating properly
83	Digital Expansion Module 3 is not operating properly

Warning History Code	Description
84	Digital Expansion Module 4 is not operating properly
85	Analog Expansion Module 1 is not operating properly
86	Analog Expansion Module 2 is not operating properly
87	Analog Expansion Module 3 is not operating properly
88	Analog Expansion Module 4 is not operating properly
90	Control Module installed does not match the expected type
91	Sensing Module installed does not match the expected type
92	Comms Module installed does not match the expected type
93	Operator Station installed does not match expected type
94	Digital Module installed does not match the expected type
95	Analog Module installed does not match the expected type
98	A hardware fault condition was detected

Warning History Mask

Users can decide which warning events are recorded into the CEP9 Electronic Overload Relay's warning history by using the Warning History Masks.

Current Warning History Mask

Current Warning History Mask (Parameter 145) allows users to select which current based warning events are recorded in the warning history.

Table 320 - Current Warning History Mask (Parameter 145)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Overload Warning
																Reserved
													X			Ground Fault Warning
																Reserved
											X					Jam Warning
										X						Underload Warning
									X							Current Imbalance Warning
								X								L1 Under Current Trip
							X									L2 Under Current Trip
						X										L3 Under Current Trip
					X											L1 Over Current Trip
				X												L2 Over Current Trip
			X													L3 Over Current Trip
		X														L1 Line Loss Trip
	X															L2 Line Loss Trip
X																L3 Line Loss Trip

Voltage Warning History Mask

Voltage Warning History Mask (Parameter 146) allows users to select which voltage based warning events are recorded in the warning history.

Table 321 - Voltage Warning History Mask (Parameter 146)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under Voltage Warning
														X		Over Voltage Warning
													X			Voltage Imbalance Warning
												X				Phase Rotation Warning
											X					Under Frequency Warning
										X						Over Frequency Warning
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved

Power Warning History Mask

Power Warning History Mask (Parameter 147) allows users to select which power based warning events are recorded in the warning history.

Table 322 - Power Warning History Mask (Parameter 147)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
															X	Under kW Warning
														X		Over kW Warning
													X			Under kVAR Consumed Warning
												X				Over kVAR Consumed Warning
											X					Under kVAR Generated Warning
										X						Over kVAR Generated Warning
									X							Under kVA Warning
								X								Over kVA Warning
							X									Under Power Factor Lagging Warning
						X										Over Power Factor Lagging Warning
					X											Under Power Factor Leading Warning
				X												Over Power Factor Leading Warning
																Reserved
																Reserved
																Reserved
																Reserved

Control Warning History Mask

Control Warning History Mask (Parameter 148) allows users to select which control based warning events are recorded in the warning history.

Table 323 - Control Warning History Mask (Parameter 148)

Bit																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Function
																Reserved
														X		PTC Warning
													X			DeviceLogix Warning
																Reserved
																Reserved
																Reserved
																Reserved
																Reserved
							X									Option Match Warning
						X										Feedback Timeout Warning
					X											Expansion Bus Warning
				X												Number Of Starts Warning
			X													Operating Hours Warning
																Reserved
																Reserved
																Reserved

Trip Snapshot

Trip Snapshot L1-L2 Voltage

Trip Snapshot L1-L2 Voltage (Parameter 156) reports the voltage in volts in reference to the T1 and T2 power terminals of the CEP9 Electronic Overload Relay Sensing Module at the time of the most recent trip event.

Table 324 - Trip Snapshot L1-L2 Voltage (Parameter 156)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

Trip Snapshot L2-L3 Voltage

Trip Snapshot L2-L3 Voltage (Parameter 157) reports the voltage in volts in reference to the T2 and T3 power terminals of the CEP9 Electronic Overload Relay Sensing Module at the time of the most recent trip event.

Table 325 - Trip Snapshot L2-L3 Voltage (Parameter 157)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

Trip Snapshot L3-L1 Voltage

Trip Snapshot L3-L1 Voltage (Parameter 158) reports the voltage in volts in reference to the T3 and T1 power terminals of the CEP9 Electronic Overload Relay Sensing Module at the time of the most recent trip event.

Table 326 - Trip Snapshot L3-L1 Voltage (Parameter 158)

Default Value	0.0
Minimum Value	0.0
Maximum Value	6553.5
Parameter Type	UINT
Size (Bytes)	2
Scaling Factor	10
Units	Volts

Trip Snapshot Total Real Power

Trip Snapshot Total Real Power (Parameter 159) reports the total real power of the monitored power conductors in kW at the time of the most recent trip event.

Table 327 - Trip Snapshot Total Real Power (Parameter 159)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kW

Trip Snapshot Total Reactive Power

Trip Snapshot Total Reactive Power (Parameter 160) reports the total Reactive power of the monitored power conductors in kVAR at the time of the most recent trip event.

Table 328 - Trip Snapshot Total Reactive Power (Parameter 160)

Default Value	0.000
Minimum Value	-2000000.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVAR or MVAR

Trip Snapshot Total Apparent Power

Trip Snapshot Total Apparent Power (Parameter 161) reports the total apparent power of the monitored power conductors in kVA at the time of the most recent trip event.

Table 329 - Trip Snapshot Total Apparent Power (Parameter 161)

Default Value	0.000
Minimum Value	0.000
Maximum Value	2000000.000
Parameter Type	DINT
Size (Bytes)	4
Scaling Factor	1000
Units	kVA

Trip Snapshot Total Power Factor

Trip Snapshot Total Power Factor (Parameter 162) reports the total power factor of the monitored power conductors in percentage at the time of the most recent trip event.

Table 330 - Trip Snapshot Total Power Factor (Parameter 162)

Default Value	0.0
Minimum Value	-100.0
Maximum Value	100.0
Parameter Type	INT
Size (Bytes)	2
Scaling Factor	10
Units	%

EtherNet/IP Communications

Introduction

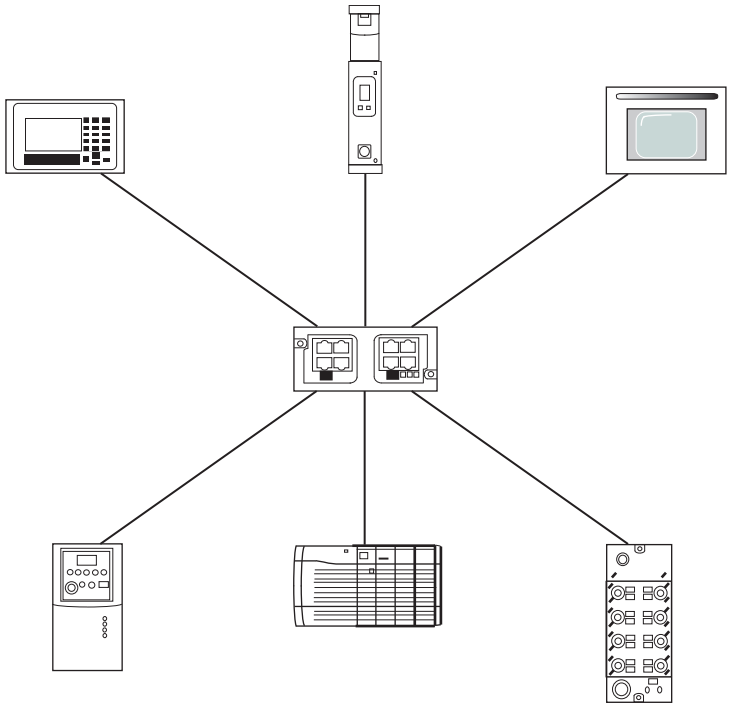
The purpose of this chapter is to provide the necessary instructions to successfully connect the CEP9 Electronic Overload Relay EtherNet/IP Communication Module (Catalog Number CEP9-ECM-ETR) to an Ethernet network and configure it to communicate to an EtherNet/IP scanner such as an Allen-Bradley Logix controller.

Network Design

The CEP9 Electronic Overload Relay EtherNet/IP Communication Module has dual Ethernet ports that function as an Ethernet switch with RJ-45 ports to which you can connect Ethernet cable CAT5 type or better.

The CEP9 Electronic Overload Relay EtherNet/IP Communication Module supports a Star, Linear, and Ring Ethernet topology. An example of a Star Ethernet Topology is shown below in which all Ethernet nodes wire back to a central Ethernet switch, hub, or router.

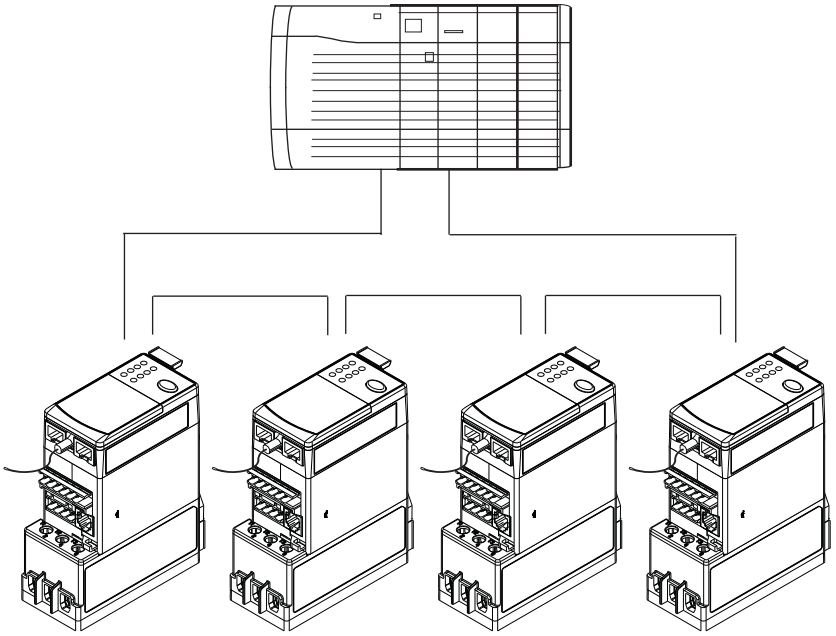
Figure 42 - Star Ethernet Topology



The CEP9 Electronic Overload Relay EtherNet/IP Communication Module also supports an EtherNet Ring topology in which all Ethernet nodes are wired in

series with one another until a complete network ring is made as shown below. The CEP9 Electronic Overload Relay EtherNet/IP Communication Module supports Rockwell Automation's Device Level Ring (DLR) topology as a slave device in which the EtherNet/IP network will still continue to communicate in the event that one of the network chains is disrupted

Figure 43 - Ring Ethernet Topology



Determining Network Parameters

To operate an EtherNet/IP network, you must define these parameters.

Table 331 - EtherNet/IP Network Parameters

Network Parameter	Description
IP Address	The IP address uniquely identifies the module. The IP address is in the form xxx.xxx.xxx.xxx where each xxx is a number from 0...255. Do not use the following IP addresses, as these are reserved values: • 0.0.0.1...0.255.255.255 • 127.0.0.0...127.255.255.255 • 224.255.255.255...255.255.255.255
Subnet Mask	Subnet addressing is an extension of the IP address scheme that allows a site to use a single network ID for multiple physical networks. Routing outside of the site continues by dividing the IP address into a net ID and a host ID via the class. Inside a site, the subnet mask is used to redivide the IP address into a custom network ID portion and host ID portion. **NOTE:** If you change the subnet mask of an already-configured module, you **must** cycle power to the module for the change to take effect.
Gateway	A gateway connects individual physical networks into a system of networks. When a node needs to communicate with a node on another network, a gateway transfers the data between the two networks.

If DNS addressing is used or if the module is referenced via a host name in a MSG instruction, the following parameters must be defined.

IMPORTANT Consult with your Ethernet network administrator to determine if these parameters need to be specified.

Table 332 - EtherNet/IP Network Parameters for DNS Addressing

Network Parameter	Description
Host Name	A host name is part of a text address that identifies the module. The full text address of a module is: *host_name.domain_name*.
Domain Name	A domain name is part of a text address that identifies the domain in which the module resides. The full text address of a module is: *host_name.domain_name*. The domain name has a 48-character limit.
Primary DNS Server Address	This identifies any DNS servers used in the network. You must have a DNS server configured if you specify an SMTP server with a name. The DNS server converts the domain name or host name to an IP address that can be used by the network. For more information on DNS addressing, refer to page 290.
Secondary DNS Server Address	

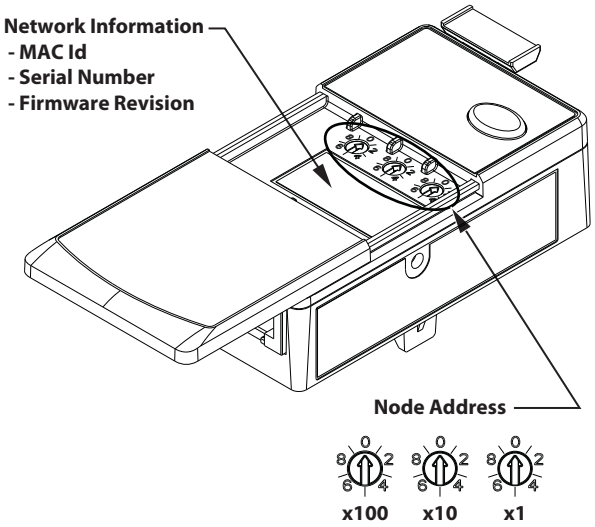
Setting the IP Network Address

The CEP9 Electronic Overload Relay EtherNet/IP Communication Module ships with DHCP enabled. You can set the network Internet Protocol (IP) address by using:

- The EtherNet/IP node address selection switches
- A Bootstrap Protocol (BOOTP)/Dynamic Host Configuration Protocol (DHCP) server (e.g., the Rockwell Automation BOOTP-DHCP Server Utility, which is included with Rockwell Software's RSLinx™ Classic software)
- A web browser and MAC scanner software

EtherNet/IP Node Address Selection Switches

The CEP9 Electronic Overload Relay EtherNet/IP Communication Module comes with three node address selection switches that allow the user to select the last octet for the IP address 192.168.1.xxx.



Node Address	Function
001 - 254	Set IP Address to 192.168.1.xxx
255 - 887 889 - 999	Set IP Address via DHCP or use static IP Address
888	Reset to factory defaults
000	Administration mode

EXAMPLE When the left dial is set to 1, the middle dial is set to 2, and the right dial is set to 3, the resulting IP address is: 192.168.1.123.

When the node address selection switches are set to a value greater than 255 (excluding 888), the IP address is set to DHCP Enabled or programmed for a static IP address.A power cycle is required for any selection changes to take effect.

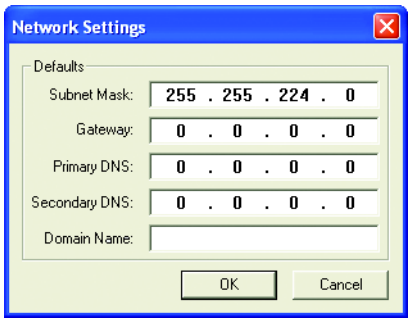
Assign Network Parameters via the BOOTP/ DHCP Utility

By default, the CEP9 Electronic Overload Relay EtherNet/IP Communication Module is DHCP Enabled. The BOOTP/DHCP utility is a standalone program that is located in the BOOTPDHCP Server folder accessed from the Start menu.

IMPORTANT Before starting the BOOTP/DHCP utility, make sure you have the hardware MAC ID of the module, which is printed on the front of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module. The MAC ID has a format similar to: 00-0b-db-14-55-35.

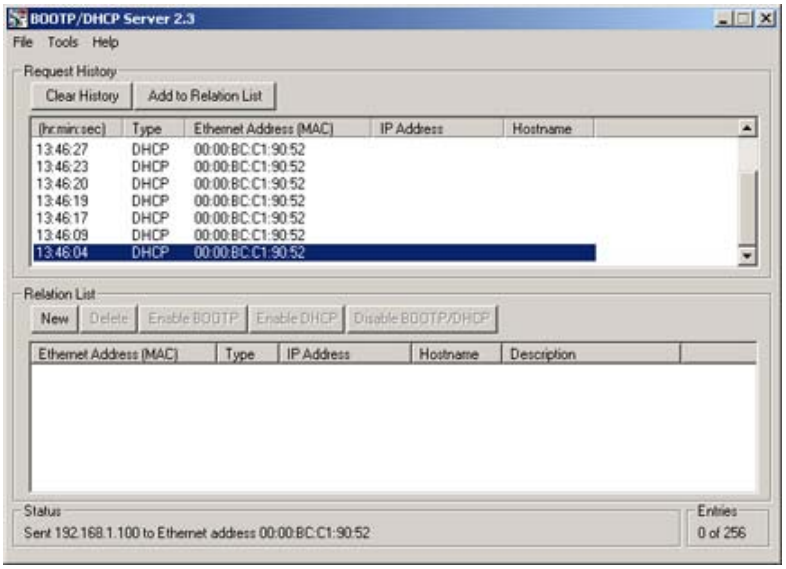
This utility recognizes DHCP-enabled devices and provides an interface to configure a static IP address for each device. To assign network parameters via the BOOTP/DHCP utility, perform this procedure:

1. Execute the BOOTP/DHCP software.
2. Choose Tool >Network Settings.
3. If appropriate for the network, type the subnet mask, gateway address, primary/secondary server addresses, and domain name in their respective fields.

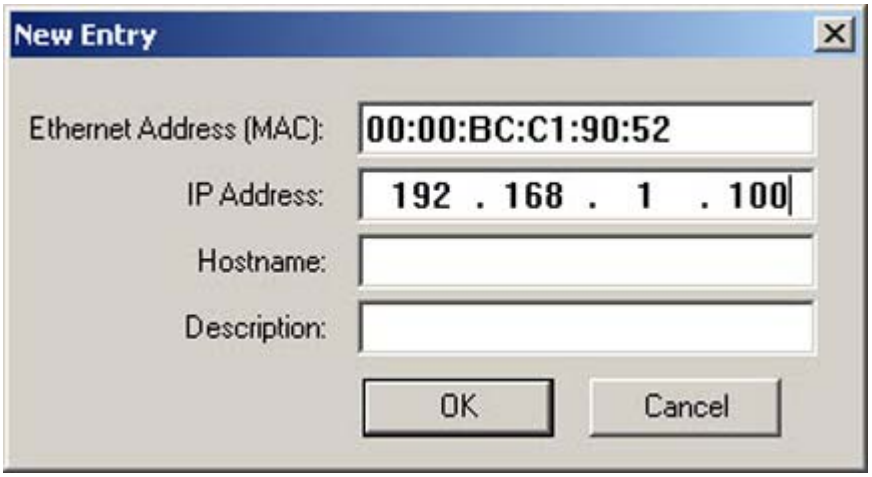

Network Settings
Defaults
Subnet Mask: 255 . 255 . 224 . 0
Gateway: 0 . 0 . 0 . 0
Primary DNS: 0 . 0 . 0 . 0
Secondary DNS: 0 . 0 . 0 . 0
Domain Name:
OK
Cancel

4. Click OK.
   The Request History panel displays the hardware addresses of modules issuing BOOTP or DHCP requests.
5. Double-click the MAC address of the module to be configured.

NOTE: The MAC address is printed underneath the sliding front cover of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module. The format of the hardware address resembles: 00-0b-db-14-55-35



The New Entry window appears with the module's Ethernet Address (MAC).



6. Type the IP address, host name, and a module description.
7. Click OK.
8. Cycle power to the CEP9 Electronic Overload Relay EtherNet/IP Communication Module.
9. To permanently assign this configuration to the module: Select the module in the Relation List panel and click Disable BOOTP/DHCP.

When module power is cycled, it uses the assigned configuration and does not issue a DHCP request.

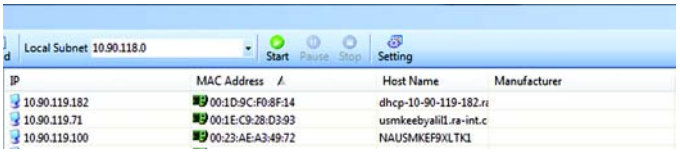
If you do not click Disable BOOTP/DHCP, on a power cycle, the module clears the current IP configuration and will again begin sending DHCP requests.

Assign Network Parameters Via a Web Browser & MAC Scanner Software

In the event that a user does not have access to a DHCP software utility, a user can assign network parameters via a web browser (e.g., Microsoft® Internet Explorer) and Media Access Control (MAC) scanner software (e.g., MAC Scanner from Colasoft® - http://www.colasoft.com/). Follow these steps to configure the module using this method.

1. Locate and identify the MAC ID printed on the label of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module. This address has a format that is similar to: 00-0b-db-14-55-35
2. Connect the CEP9 Electronic Overload Relay EtherNet/IP Communication Module to the same wide area network (WAN) as your personal computer.
3. Initiate the MAC scanner software.
4. Select the appropriate subnet to scan for available MAC addresses.

5. Scan the Subnet for all available MAC addresses.



6. Identify the IP address assigned to the MAC ID of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module. The IP address will have a format that is similar to 192.168.0.100.

Other Factors to Consider When Assigning Network Parameters

There are other factors to consider when assigning network parameters, which include:

- Network isolation from or integration into the plant/enterprise network.
- Network size. For large networks, even isolated networks, it might be more convenient and safer to use a BOOTP/DHCP server rather than RSLinx software. The BOOTP/DHCP server also limits the possibility of assigning duplicate IP addresses.
- Company policies and procedures associated with plant floor network installation and maintenance.
- Level of involvement by information technology personnel in plant floor network installation and maintenance.
- Type of training offered to control engineers and maintenance personnel.

If the Rockwell Automation DHCP server is used in an uplinked subnet where an enterprise DHCP server exists, a module may get an address from the enterprise server before the Rockwell Automation utility even sees the module. In this case, disconnect the uplink to set the address and configure the module to retain its static address before reconnecting to the uplink. This is not a problem if you have node names configured in the module and leave DHCP enabled.

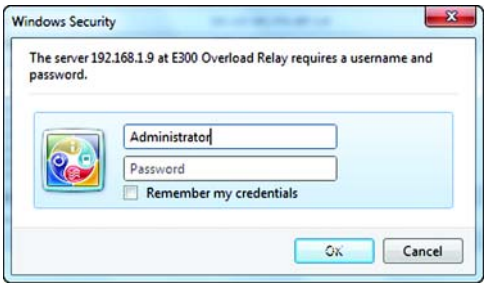
Web Server

As a security precaution the embedded web server of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module is disabled by default. To temporarily enable the web server to make it permanently available, the user must enter into Administration Mode. To do this, set the rotary dials located underneath the front cover of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module to 000 and cycle power. The device will then go online with the IP Address used at the time of the previous start-up.

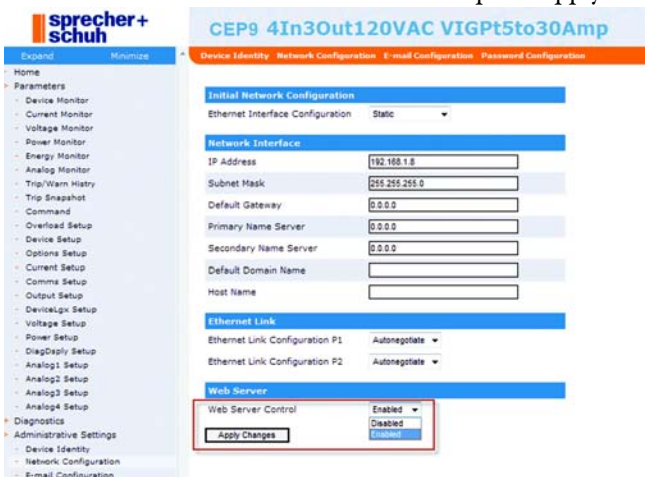
Permanently Enabling the Web Server

In Administrative Mode, the user can change any configuration parameter of the CEP9 Electronic Overload Relay including permanently enabling the embedded web server by following these steps:

1. Enter Administrative Mode by turning the rotary dials to 000 and cycle power on the CEP9 Electronic Overload Relay
2. Access the web page
3. Navigate to Administrative Settings->Network Configuration
4. You will be prompted for user name and password. The default user name is Administrator, and the default password is <blank>. Enter "Administrator" as the user name, and leave the "password" field blank as shown below:



5. Enable the Web Server Control and press Apply Changes



Duplicate IP Address Detection

When you change the IP address or connect the module to an EtherNet/IP network, the module checks to make sure that the IP address assigned to this module does not match the address of any other network device. If the module determines that another device on the network with a matching IP address, the EtherNet/IP port of the module goes into conflict mode where the Network Status LED indicator is solid red.

To resolve this conflict, use the instructions below to change the IP address of the module. Then, cycle power to the module or reset the modules by disconnecting and then reconnecting the Ethernet cable.

Two modules could possibly detect a conflict simultaneously. If this occurs, perform this procedure.

1. Remove the module with the incorrect IP address and correct its conflict.
2. Cycle power or disconnect the Ethernet cable from the second module and reconnect it.

Behavior of Modules With Duplicate IP Addresses

Devices in conflict over an IP address behave differently depending on whether connections have been established to either of the modules and whether both modules support duplicate IP address detection.

Table 333 - Device Conflict over Duplicate IP Addresses

If	then
both modules support duplicate IP address detection,	the first started module uses and retains its IP address. The other module will detect a conflict, give up the IP address and enter conflict mode.
both modules support duplicate IP address detection and are started at roughly the same time,	one of the modules surrenders the IP address and enters conflict mode.
one module supports duplicate IP address detection and a second module does not,	the second module generally keeps its IP address, regardless of which module first obtains the IP address. The module that supports duplicate IP address detection will detect the conflict and give up the IP address.

DNS Addressing

To further qualify a module's address, use DNS addressing to specify a host name for a module, which also includes specifying a domain name and DNS servers. DNS addressing makes it possible to set up similar network structures and IP address sequences under different domains.

DNS addressing is only necessary if you refer to the module by host name, such as in path descriptions in MSG instructions.

To use DNS addressing, perform this procedure.

1. Assign a host name to the module.

   NOTE: Contact the network administrator to have a host name assigned. Valid host names should be IEC-1131-3 compliant.

2. Configure the module's parameters.

In addition to the IP address, subnet mask, and gateway address, configure a host name for the module, domain name, and primary/secondary DNS server addresses.

Electronic Data Sheet (EDS) File Installation

Before the CEP9 Electronic Overload Relay EtherNet/IP Communication Module is configured to communicate on an EtherNet/IP network, it must be registered to the software that configures the network (e.g., Rockwell Automation RSLinx Classic and RSNetWorx for EtherNet/IP software). A user registers the module by installing an EDS file. The EDS file for the CEP9 Electronic Overload Relay EtherNet/IP Communication Module can be obtained from one of two locations:

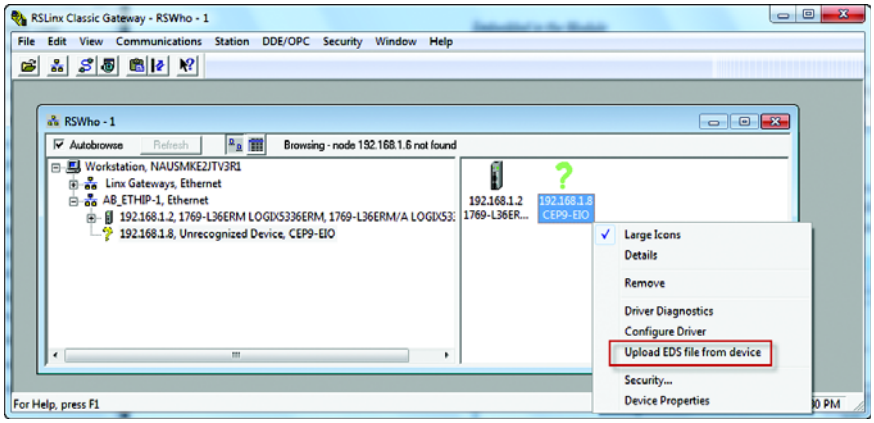
- Embedded in the module
- The Sprecher + Schuh EDS file download website..

Download the EDS File

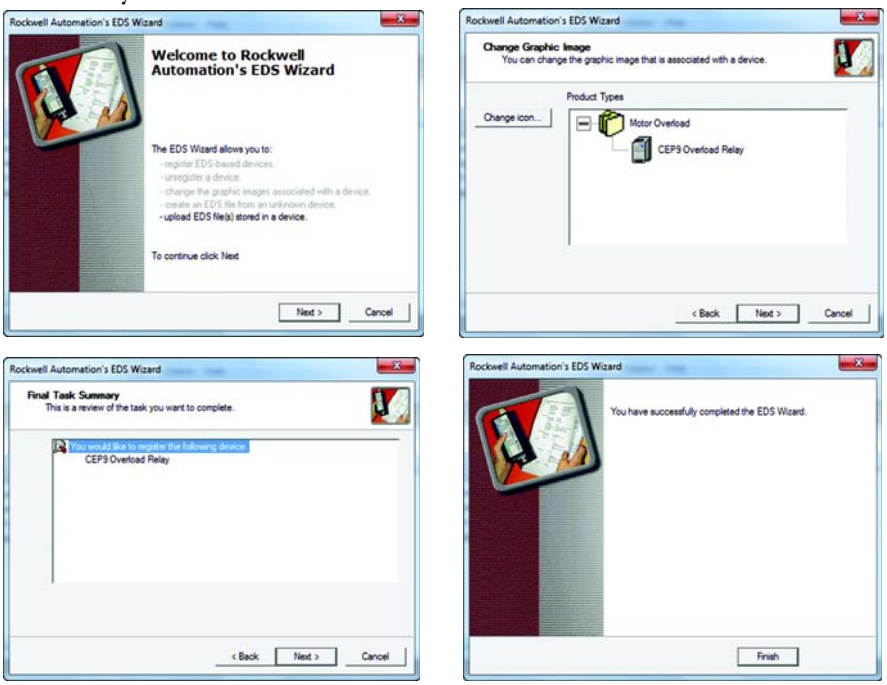
Embedded in the Module

The EDS file for the CEP9 Electronic Overload Relay EtherNet/IP Communication Module is embedded within the module. Using RSLinx Classic, the user can install the CEP9 Electronic Overload Relay EtherNet/IP Communication Module's EDS file from the RSLinx Classic RSWho screen using these steps:

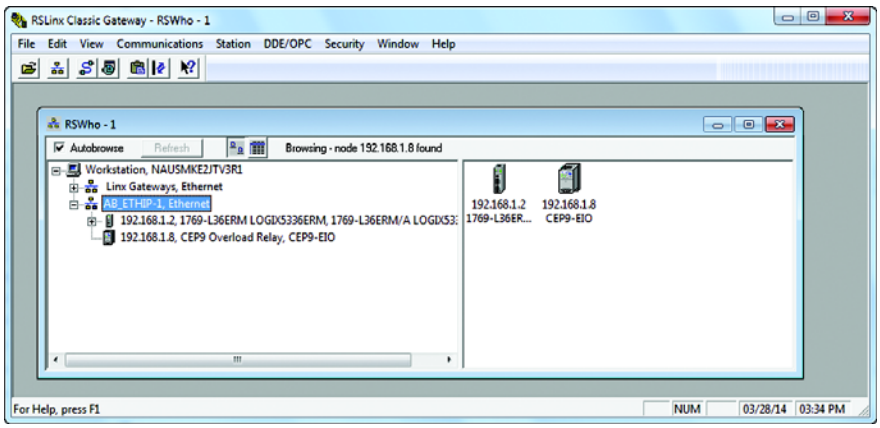
1. Open RSLinx Classic and browse the EtherNet/IP network that has the CEP9 Electronic Overload Relay. It will be identified with a yellow question mark. Right click on the unrecognized device and select "Upload EDS File from Device".



2. Using the EDS Wizard, install the embedded CEP9 Electronic Overload Relay EtherNet/IP Communication Module EDS file.


Rockwell Automation's EDS Wizard
Welcome to Rockwell Automation's EDS Wizard
The EDS Wizard allows you to:
- upload EDS file(s) stored in a device.
To continue click Next
Next > Cancel
Change Graphic Image
You can change the graphic image that is associated with a device.
Product Types
Change icon...
Motor Overload
CEP9 Overload Relay
< Back Next > Cancel
Final Task Summary
This is a review of the task you want to complete.
You would like to register the following device:
CEP9 Overload Relay
< Back Next > Cancel
You have successfully completed the EDS Wizard.
Finish

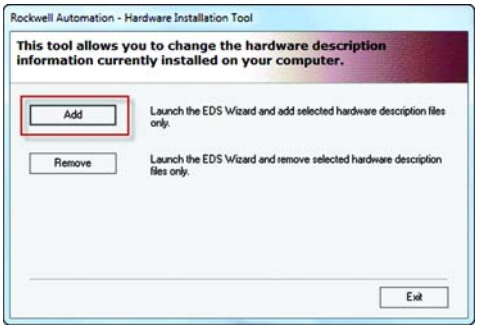
3. When finished, RSLinx Classic will recognize the newly registered CEP9 Electronic Overload Relay EtherNet/IP Communication Module.



From the EDS File Download Site

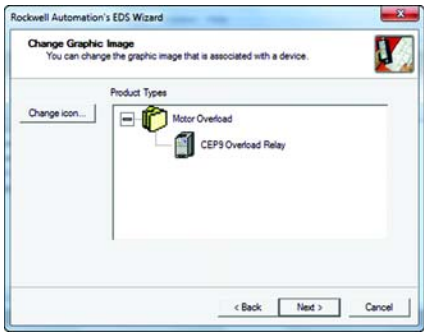
The EDS file for the CEP9 Electronic Overload Relay EtherNet/IP Communication Module can also be downloaded from the Sprecher + Schuh web site. Using a web browser on the personal computer that is connected to the internet, a user can download the EDS file by following these steps:

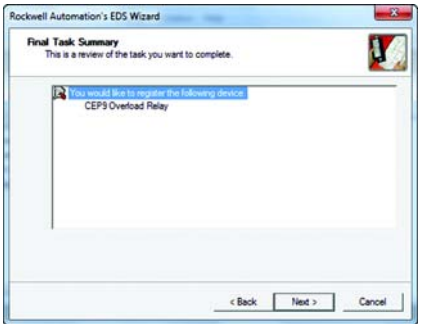
1. Type http://www.sprecherschuh.com.
2. Locate the EDS file for the CEP9 Electronic Overload Relay EtherNet/IP Communication Module and download it to the personal computer.
3. Start the EDS Hardware Installation Tool located at Start>Programs>Rockwell Software>RSLinx Tools and Add a new device


Rockwell Automation - Hardware Installation Tool
This tool allows you to change the hardware description information currently installed on your computer.
Add
Launch the EDS Wizard and add selected hardware description files only.
Remove
Launch the EDS Wizard and remove selected hardware description files only.
Exit

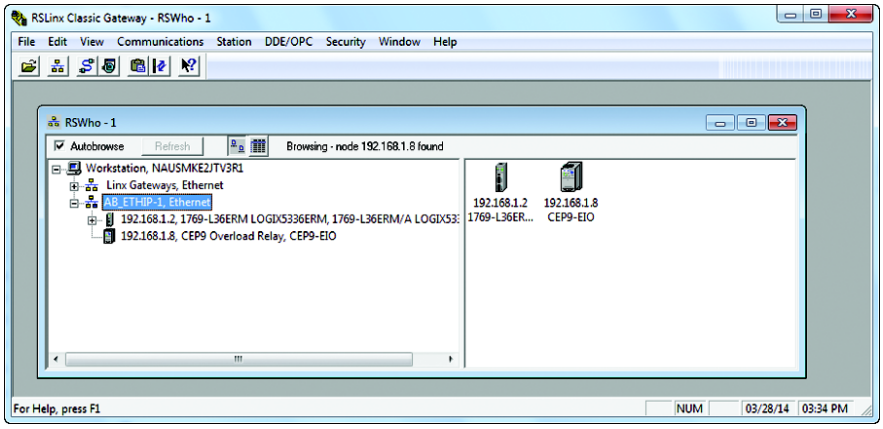
4. Using the EDS Wizard, install the downloaded CEP9 Electronic Overload Relay EtherNet/IP Communication Module EDS file.

Rockwell Automation's EDS Wizard
Welcome to Rockwell Automation's EDS Wizard
The EDS Wizard allows you to:
- upload EDS file(s) stored in a device.
To continue click Next
Next >
Cancel




Rockwell Automation's EDS Wizard
Final Task Summary
This is a review of the task you want to complete.
You would like to register the following device:
CEP9 Overload Relay
< Back
Next >
Cancel

5. When finished, RSLinx Classic will recognize the newly registered CEP9 Electronic Overload Relay EtherNet/IP Communication Module.



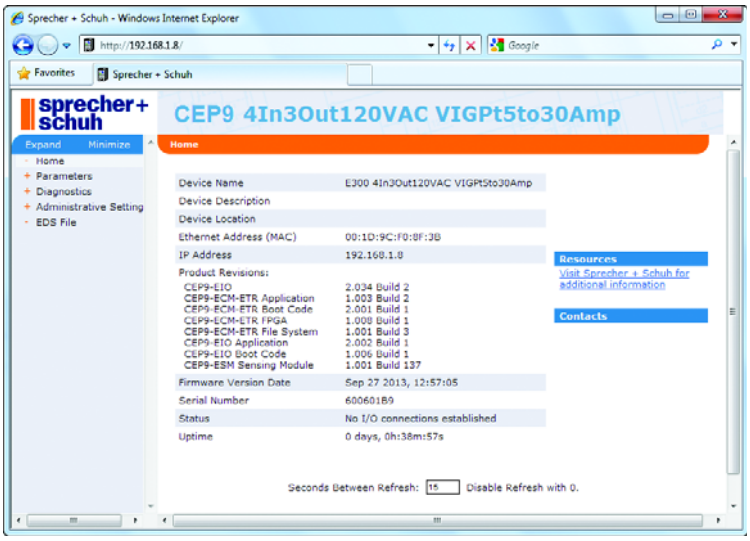
View & Configure Parameters

The web server in the CEP9 Electronic Overload Relay EtherNet/IP Communication Module when enabled is able to view and configure parameters for the CEP9 Electronic Overload Relay. Users can use the web interface to edit parameters for CEP9 Electronic Overload Relay if it is not being scanned by an EtherNet/IP scanner.

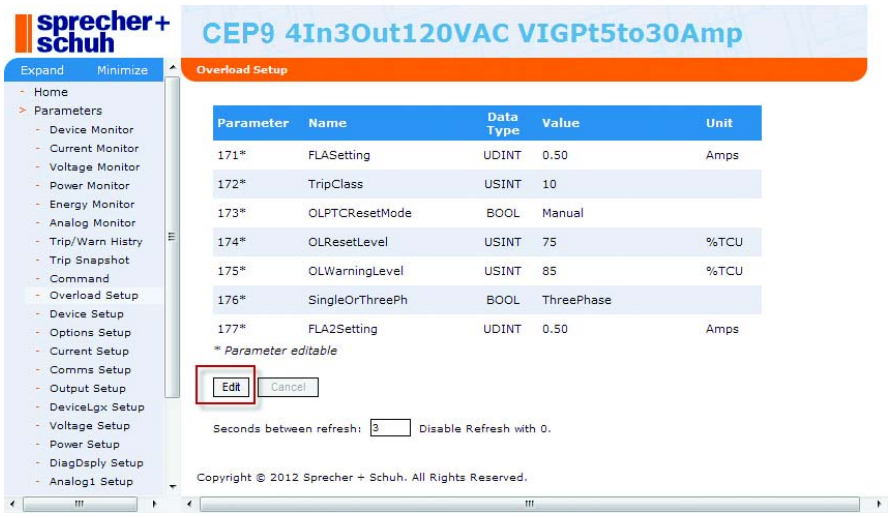
Viewing Parameters

Follow the steps below to view parameters using the web interface of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module.

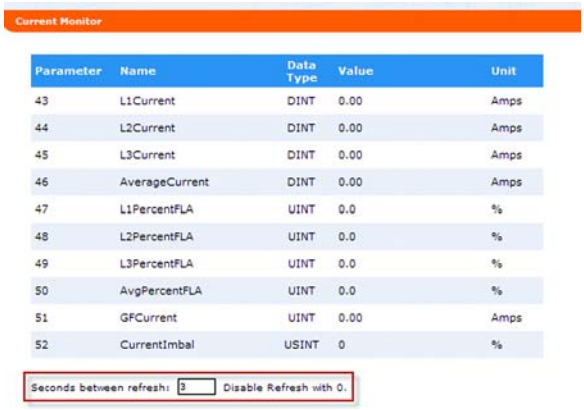
1. Using a web browser, open the web page of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module by typing its IP address for the URL.



2. Navigate to the Parameters folder and select a parameter group. The example below shows the information from the Current Monitoring parameters.



3. To increase the update rate of the data being viewed, enter a faster update time in the refresh rate box shown below:

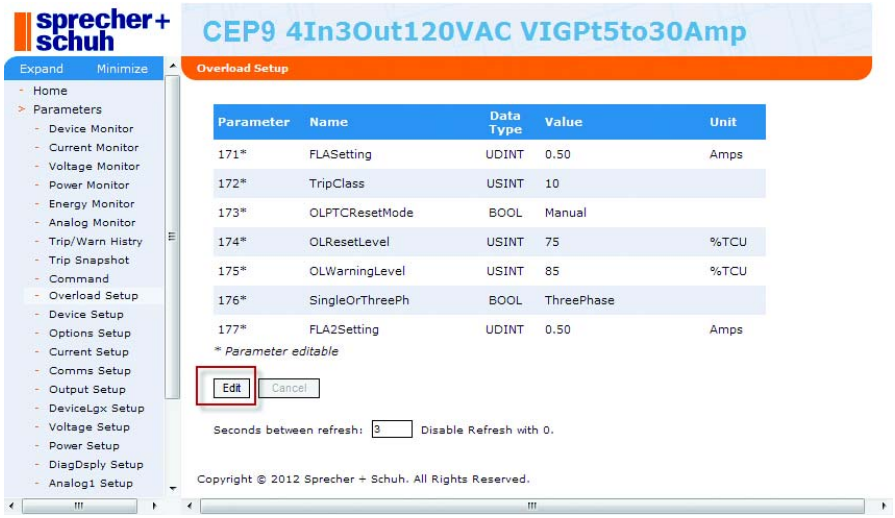

Current Monitor
Parameter Name Data Type Value Unit
43 L1Current DINT 0.00 Amps
44 L2Current DINT 0.00 Amps
45 L3Current DINT 0.00 Amps
46 AverageCurrent DINT 0.00 Amps
47 L1PercentFLA UINT 0.0 %
48 L2PercentFLA UINT 0.0 %
49 L3PercentFLA UINT 0.0 %
50 AvgPercentFLA UINT 0.0 %
51 GFCurrent UINT 0.00 Amps
52 CurrentImbal USINT 0 %
Seconds between refresh: 3 Disable Refresh with 0.

4. CEP9 Electronic Overload Relay EtherNet/IP Communication Module web page displays up to 17 parameters per web page. If more than 17 parameters exist for a parameter group, use the navigation arrows to display the other parameters.

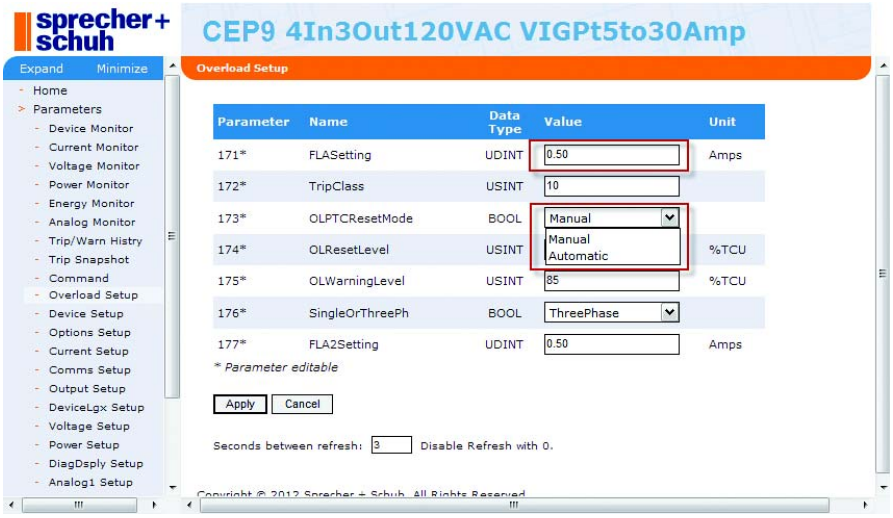
Editing Parameters

Follow the steps below to edit configuration parameters using the web interface of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module.

1. Select a parameter group that contains programmable parameters, then click the Edit button. The value options will appear.

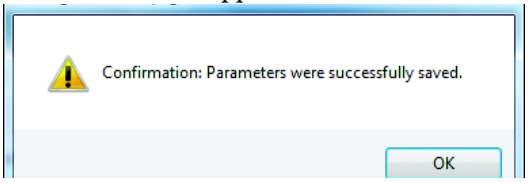


2. Click the down arrow on the pull-down boxes to adjust fixed values and/or enter numerical values in the fields without an arrow to adjust the values.

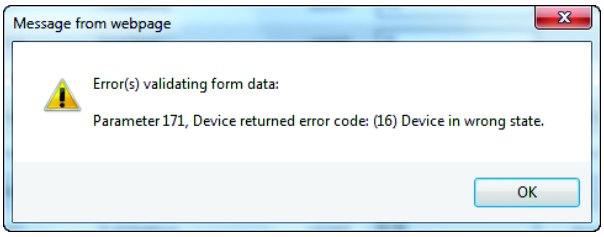


3. Click Apply once all parameter edits have been completed. The CEP9 Electronic Overload Relay EtherNet/IP Communication Module will download the new parameter values to the device.

4. A confirmation window will appear. Press OK.



NOTE: If the user attempts to edit a configuration parameter when a Class 1 EtherNet/IP connection exists between an EtherNet/IP scanner and the CEP9 Electronic Overload Relay EtherNet/IP Communication Module, a message similar to the one shown below will appear when the Apply button is pressed.



Automation Controller Communications

The CEP9 Electronic Overload Relay EtherNet/IP Communication Module supports two types of EtherNet/IP messaging.

- I/O Messaging - Used for deterministic EtherNet/IP communications with ControlLogix™, CompactLogix™, SoftLogix™, and EtherNet/IP scanners. Its primary use is to read and write I/O data for control purposes.
- Explicit Messaging - Used for non-deterministic communications in which the data is not critical for control. Logic explicit messages have a lower priority compared to I/O messages and are used to read and write non-critical data.

I/O Messaging

RSLogix 5000™ and Studio 5000™ software is used to configure I/O messaging between an automation controller and the CEP9 Electronic Overload Relay EtherNet/IP Communication Module on an EtherNet/IP network.

Shown below are two examples and the steps necessary to configure a Logix controller for I/O messaging.

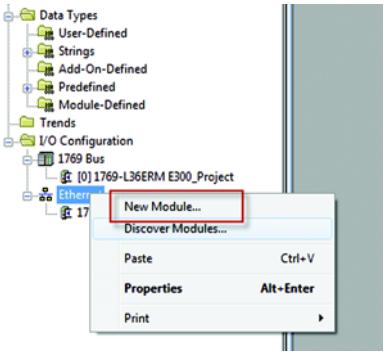
- Logix Configuration with Add-On Profile
- Logix Configuration with a Generic Profile

Logix Configuration with Add-On Profile

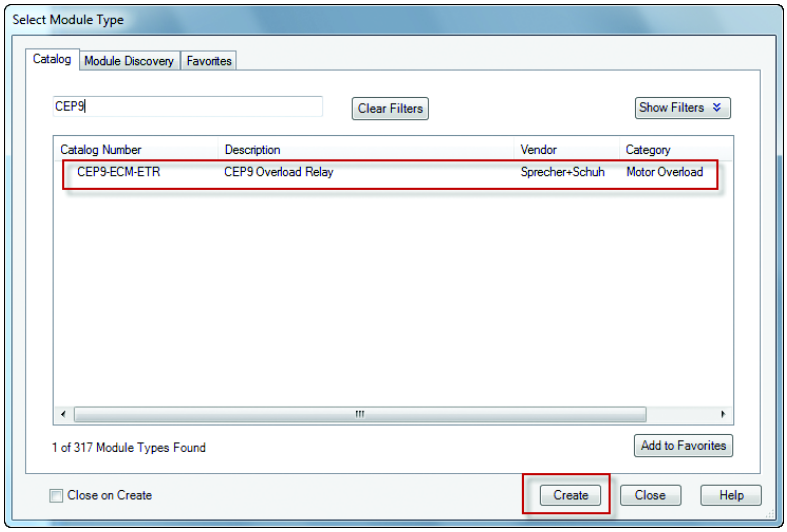
An Add-On Profile is available for the CEP9 Electronic Overload Relay EtherNet/IP Communication Module and can be used with RSLogix 5000 version 17 and higher and Studio 5000 version 21 and higher. The profile can be downloaded from:
http://compatibility.rockwellautomation.com/Pages/MultiProductFindDownloads.aspx?crumb=112&refSoft=0&toggleState=&versions=50428

An existing project can be used or a new project can be created to configure EtherNet/IP I/O Messaging. After the controller configuration, the CEP9 Electronic Overload Relay EtherNet/IP Communication Module has to be added to the I/O configuration by following these steps:

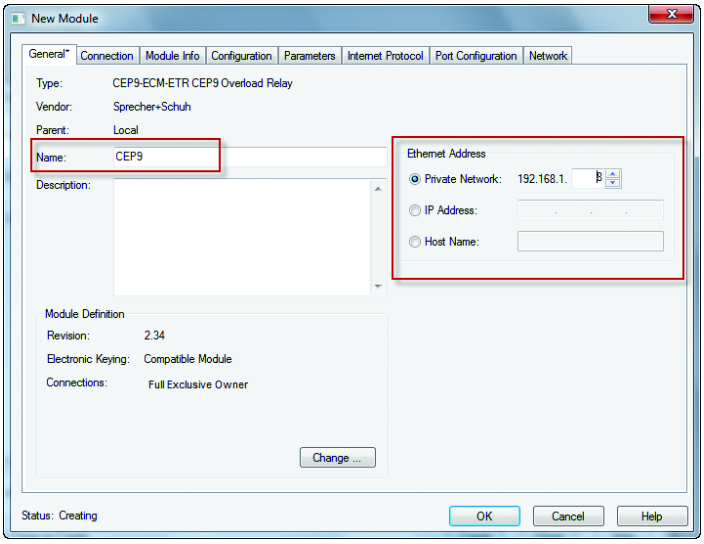
1. Right-click on the EtherNet/IP scanner within the I/O Configuration folder, then select New Module to open the Select Module Type window.



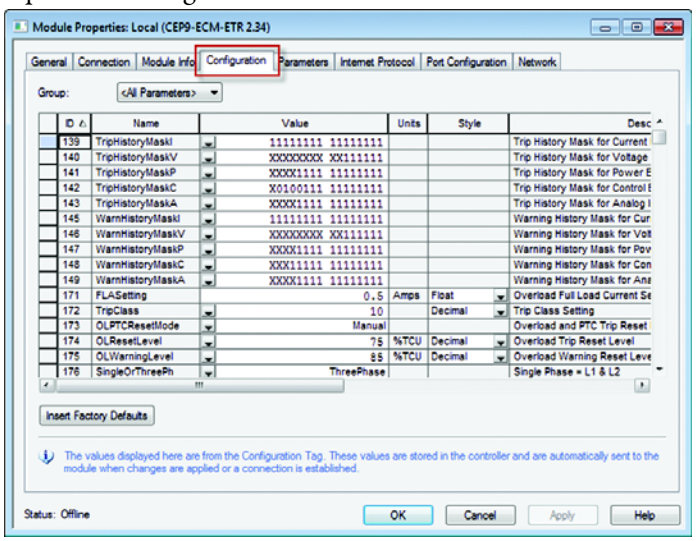
2. Select the CEP9 Electronic Overload Relay EtherNet/IP Communication Module (CEP9-ECM-ETR), then click Create.



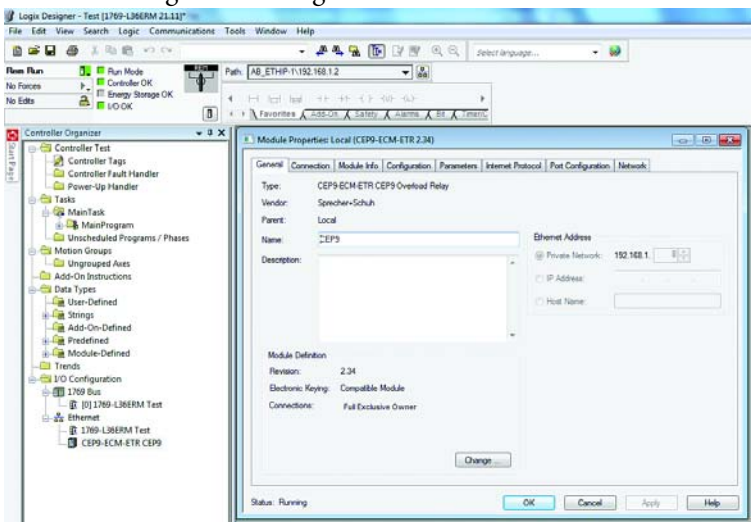
3. Enter a name and the IP address for the CEP9 Electronic Overload Relay EtherNet/IP Communication Module. The name will create tags in RSLogix 5000 or Studio 5000 that can be used to read and write data from the CEP9 Electronic Overload Relay EtherNet/IP Communication Module.



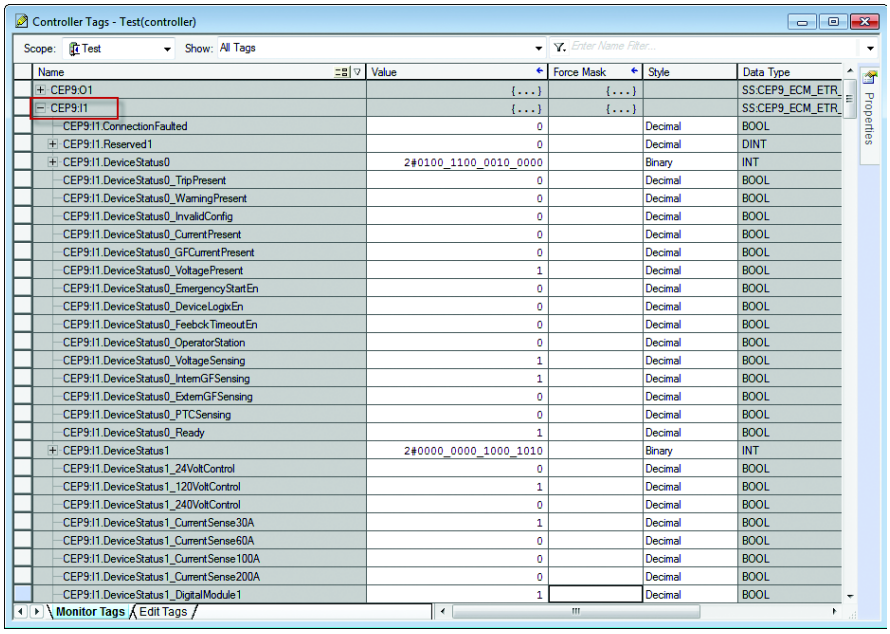
4. Next, configure the protection parameters for your specific motor application by selecting the configuration tab. When finished, press OK to complete the configuration of the CEP9 Electronic Overload Relay.


Module Properties: Local (CEP9-ECM-ETR 2.34)
General
Connection
Module Info
Configuration
Parameters
Internet Protocol
Port Configuration
Network
Group:
<All Parameters>
ID
Name
Value
Units
Style
Desc
139 TripHistoryMaskI 11111111 11111111 Trip History Mask for Current
140 TripHistoryMaskV XXXXXXXX XX111111 Trip History Mask for Voltage
141 TripHistoryMaskP XXXX1111 11111111 Trip History Mask for Power
142 TripHistoryMaskC X0100111 11111111 Trip History Mask for Control
143 TripHistoryMaskA XXXX1111 11111111 Trip History Mask for Analog
145 WarnHistoryMaskI 11111111 11111111 Warning History Mask for Cur
146 WarnHistoryMaskV XXXXXXXX XX111111 Warning History Mask for Volt
147 WarnHistoryMaskP XXXX1111 11111111 Warning History Mask for Pov
148 WarnHistoryMaskC XXX11111 11111111 Warning History Mask for Con
149 WarnHistoryMaskA XXXX1111 11111111 Warning History Mask for Ana
171 FLASetting 0.5 Amps Float Overload Full Load Current Se
172 TripClass 10 Decimal Trip Class Setting
173 OLPTCResetMode Manual Overload and PTC Trip Reset
174 OLResetLevel 75 %TCU Decimal Overload Trip Reset Level
175 OLWarningLevel 85 %TCU Decimal Overload Warning Reset Leve
176 SingleOrThreePh ThreePhase Single Phase = L1 & L2
Insert Factory Defaults
The values displayed here are from the Configuration Tag. These values are stored in the controller and are automatically sent to the module when changes are applied or a connection is established.
Status: Offline
OK
Cancel
Apply
Help

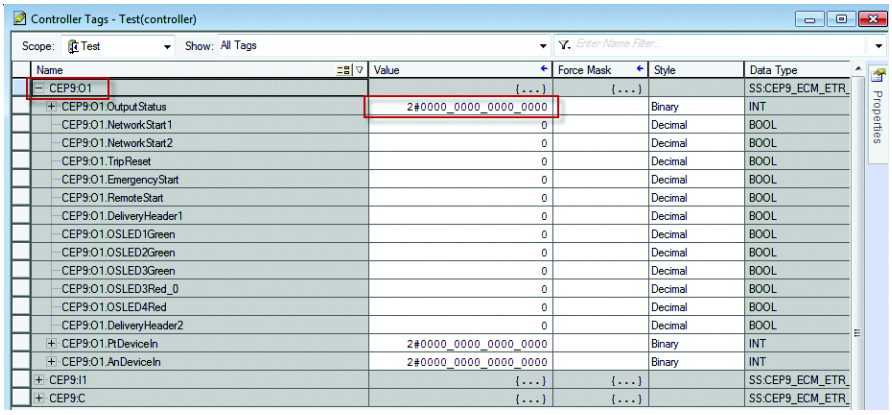
5. Download the project to the Logix controller, and place the controller into Run Mode. The CEP9 Electronic Overload Relay is actively communicating with the Logix controller.



6. To access the data provided by the CEP9 Electronic Overload Relay EtherNet/IP Communication Module, navigate to input tags created by the Add-On Profile.



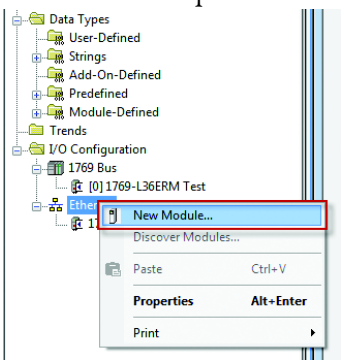
7. To control the output relays or issue a trip reset command to the CEP9 Electronic Overload Relay navigate to the output tags created by the Add-On Profile.



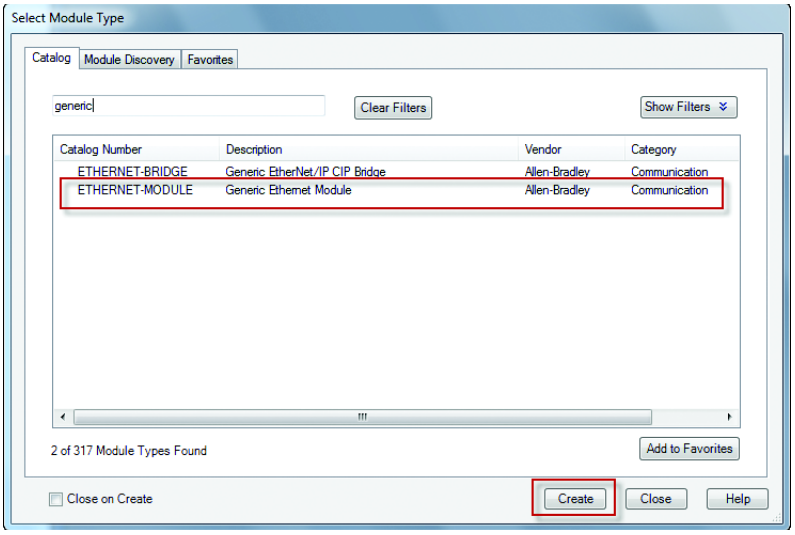
Logix Configuration with a Generic Profile

An existing project can be used or a new project can be created to configure EtherNet/IP I/O Messaging. After the Logix controller has been configured, the CEP9 Electronic Overload Relay EtherNet/IP Communication Module must be added to the I/O configuration. Follow these steps when using a Generic Profile.

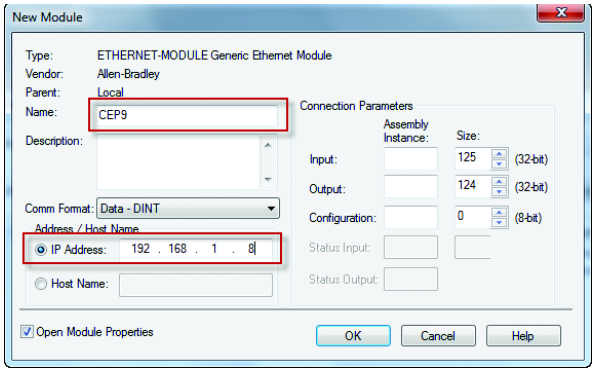
1. Right-click on the EtherNet/IP scanner within the I/O Configuration folder, then select New Module to open the Select Module Type window.



2. Select the Generic Ethernet Module, then click Create.

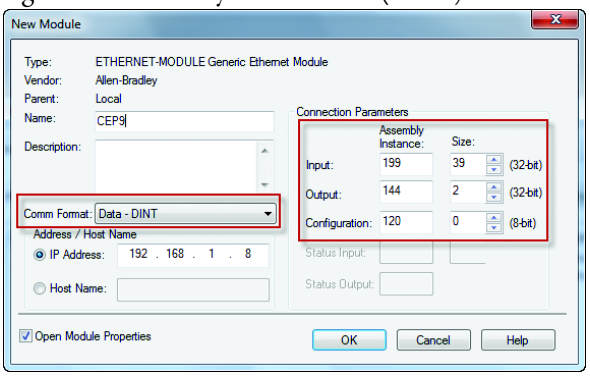


3. Enter a name and the IP address for the CEP9 Electronic Overload Relay EtherNet/IP Communication Module. The name will create tags in RSLogix 5000 or Studio 5000 that can be used to read and write data from the CEP9 Electronic Overload Relay EtherNet/IP Communication Module.



4. Select Data-DINT for the Comm Format. The Data-DINT format will represent the data from the EtherNet/IP Communications Auxiliary CEP9 Electronic Overload Relay EtherNet/IP Communication Module as a collection of 32-bit values. Set the I/O Assemblies to the following values:
   - Input Assembly Instance 199 (Size 39)
   - Output Assembly Instance 144 (Size 2)

- Configuration Assembly Instance 120 (Size 0)



5. To access the data provided by the CEP9 Electronic Overload Relay EtherNet/IP Communication Module, navigate to input tags created by the Generic Profile. The table listed below represents the Input Assembly data.

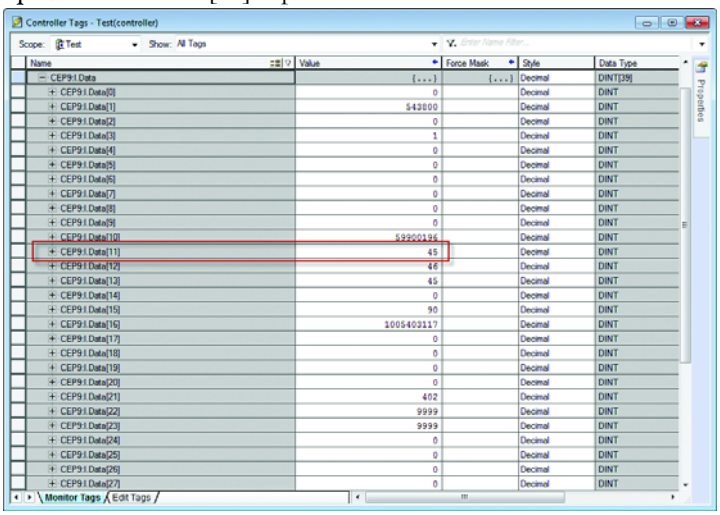
Table 334 - Instance 199 - Input (Produced) Assembly

INT	DINT	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	Reserved for Logix															
1																	
2	1	DeviceStaus0															
3		DeviceStaus1															
4	2	InputStatus0															
5		InputStatus1															
6	3	OutputStatus															
7		OpStationStatus															
8	4	TripStsCurrent															
9		WarnStsCurrent															
10	5	TripStsVoltage															
11		WarnStsVoltage															
12	6	TripStsPower															
13		WarnStsPower															
14	7	TripStsControl															
15		WarnStsControl															
16	8	TripStsAnalog															
17		WarnStsAnalog															
18	9	Reserved															
19																	
20	10									ThermUtilizedPct							
		CurrentImbalance															
21		AvgPercentFLA															
22	11	AverageCurrent															
23																	

INT	DINT	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
24	12	L1Current															
25																	
26	13	L2Current															
27																	
28	14	L3Current															
29																	
30	15	GFCurrent															
31		Reserved															
32	16	AvgVoltageLtoL															
33		L1toL2Voltage															
34	17	L2toL3Voltage															
35		L3toL1Voltage															
36	18	TotalRealPower															
37																	
38	19	TotalReactivePwr															
39																	
40	20	TotalApparentPwr															
41																	
42	21	TotalPowerFactor															
43																	
44	22	Datalink0															
45																	
46	23	Datalink1															
47																	
48	24	Datalink2															
49																	
50	25	Datalink3															
51																	
52	26	Datalink4															
53																	
54	27	Datalink5															
55																	
56	28	Datalink6															
57																	
58	29	Datalink7															
59																	
60	30	PtDeviceOuts															
61		AnDeviceOuts															
62	31	InAnMod1Ch00															
63		InAnMod1Ch01															
64	32	InAnMod1Ch02															
65		Reserved															

INT	DINT	Bit															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
66	33	InAnMod2Ch00															
67		InAnMod2Ch01															
68	34	InAnMod2Ch02															
69		Reserved															
70	35	InAnMod3Ch00															
71		InAnMod3Ch01															
72	36	InAnMod3Ch02															
73		Reserved															
74	37	InAnMod4Ch00															
75		InAnMod4Ch01															
76	38	InAnMod4Ch02															
77		Reserved															

For example, CEP9:I.Data[11] represents Ave Current as shown below.

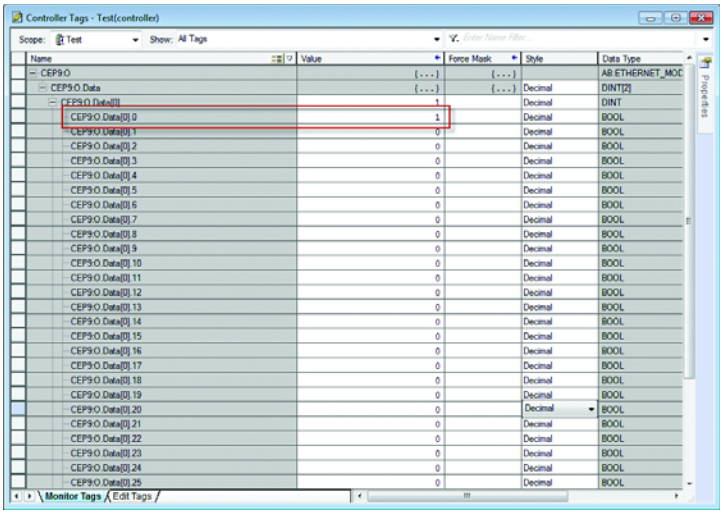


6. To control the output relays or remotely reset the CEP9 Electronic Overload Relay, navigate to the output tags created by the Generic Profile. The table listed below represents the Input Assembly data.

Table 335 - Instance 144 - Output (Consumed) Assembly

INT	DINT	Bit 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	OutputStatus0															
1		NetworkStart1															X
		NetworkStart2														X	
		TripReset													X		
		EmergencyStart												X			
		RemoteTrip											X				
		Reserved								X	X	X					
									X	HMILED1Green							
								X		HMILED2Green							
							X			HMILED3Green							
						X				HMILED3Red							
					X					HMILED4Red							
		X	X	X						Reserved							
2	1	DLXPtDeviceIn															
3		DLXAnDeviceIn															

For example, CEP9_Overload:O.Data[0].0 represents Relay Output Pt00 as shown below.



E-mail/Text

The CEP9 Electronic Overload Relay EtherNet/IP Communication Module is capable of sending e-mail messages and text notifications for different trip and warning events using an Simple Mail Transfer Protocol (SMTP) server.

The subject and body contents in the e-mail message will be created from the:

- Type of trip or warning that is detected
- Device name
- Device description
- Device location

- Contact information

EXAMPLE

E-mail Subject:

CEP9 Overload Relay has detected a fault

E-mail Body:

Fault Status:

Device Name: CEP9 Overload Relay

Device Description: Motor Starters

Device Location: Bay 6-U29

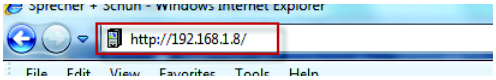
Contact Info: Contact Person contactperson@thecontact.com

The first word in the e-mail subject is the device name. If a device name is not configured, then the product name attribute from the identity object will be used.

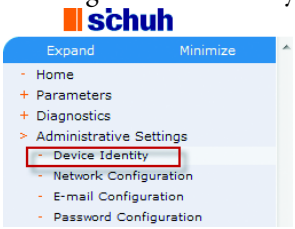
E-mail Configuration

To be able to send an e-mail, the IP address of the hostname of a Simple Mail Transfer Protocol (SMTP) server must be configured and notifications must be selected. Follow these steps to configure an e-mail notification.

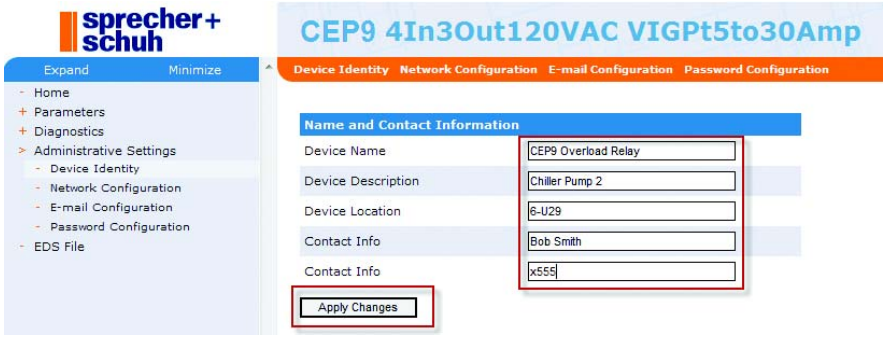
1. In the web browser, enter the IP address of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module URL of the web browser.



2. Select Administrative Settings>Device Identity



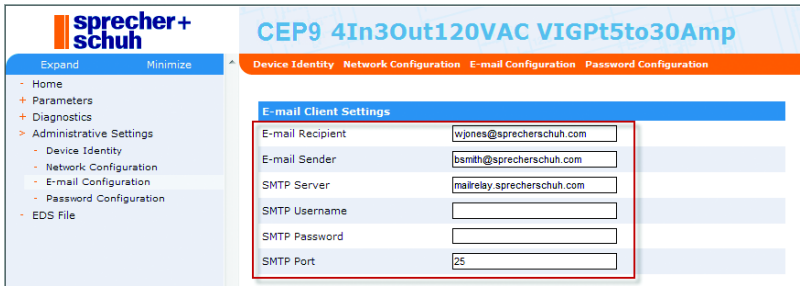
3. Type the Device Identity information into the fields as described below and press Apply.



Device Name	The name of the CEP9 Electronic Overload Relay.
Device Description	The description of the CEP9 Electronic Overload Relay.
Device Location	The location of the CEP9 Electronic Overload Relay.
Contact Information	The contact information for the CEP9 Electronic Overload Relay.

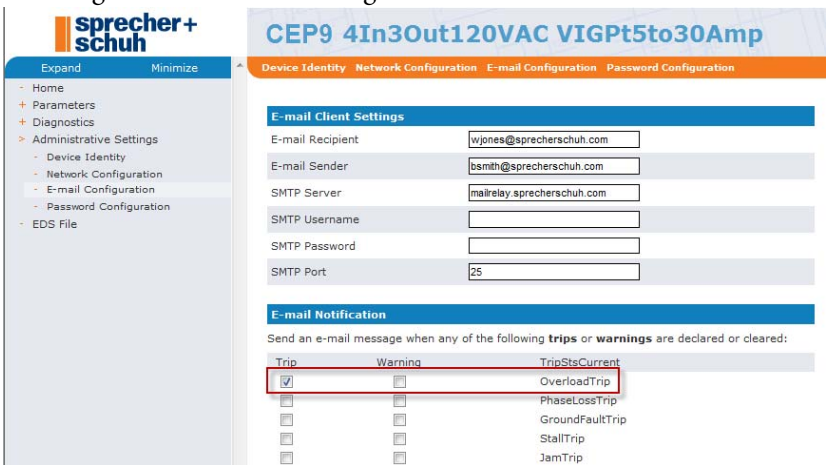
4. Select Administrative Settings>E-Mail Configuration

5. Type the information into the e-mail notification fields as stated below. Multiple e-mail addresses can be entered into the E-mail Recipient field by separating each e-mail address with a semicolon (;). The E-mail Recipient field is limited to 255 characters.

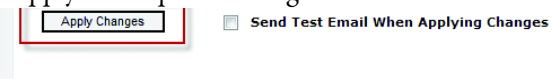


E-mail Recipient	The e-mail address of the person who will receive the notifications.
E-Mail Sender	The e-mail address from which the notification will be sent.
SMTP Server	Consult with the network administrator for the SMTP server address.
SMTP Username	Consult with the network administrator for the SMTP username.
SMTP Password	Consult with the network administrator for the SMTP password.
SMTP Port	Consult with the network administrator which SMTP port number to use. Port 25 is the most common SMTP port.

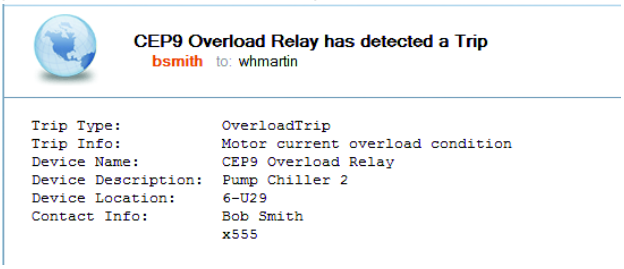
6. Check the desired notification time, fault conditions, and local conditions to be included in notification e-mails to the recipient. These can be changed after the initial configurations.



7. Click Apply to accept the configuration



8. When an CEP9 Electronic Overload Relay event occurs, the e-mail message will look like the following:


CEP9 Overload Relay has detected a Trip
bsmith to: whmartin
Trip Type: OverloadTrip
Trip Info: Motor current overload condition
Device Name: CEP9 Overload Relay
Device Description: Pump Chiller 2
Device Location: 6-U29
Contact Info: Bob Smith
x555

Text Notifications

The CEP9 Electronic Overload Relay EtherNet/IP Communication Module can send a text message to a wireless phone by e-mailing the wireless phone's service provider. The format for the text message is provided by the service provider and looks similar to the example formats below.

- AT&T™: 10-digit wireless phone number@txt.att.net
- Sprint®: 10-digit wireless phone number@messaging.sprint.pcs.com

Limitations

Based on the functionality of the CEP9 Electronic Overload Relay EtherNet/IP Communication Module, there are some limitations on when the e-mails can be triggered.

- If two events occur at the same time, an e-mail will only be sent for the most significant error.
- If the device has been configured to send an e-mail for a lower prioritized event and this event occurs at the same time as a higher prioritized event for which the device has not been programmed to send an e-mail, an e-mail will not be sent for either event.
- The Clear e-mail will only be sent when all events have been cleared and an event e-mail has previously been sent.

Troubleshooting

The following table identifies possible causes and corrective actions when troubleshooting the CEP9 Electronic Overload Relay EtherNet/IP Communication Module.

Status LED	Color	State	Possible Cause	Corrective Action
Network Status (NS)	None	—	The CEP9 EtherNet/IP Communication Module is not receiving power.	Verify that the proper control voltage exists between terminals A1 and A2 on the CEP9 Control Module.
	Green, Red, Not Illuminated	Flashing (once)	Normal	This is a normal power-up sequence.
	Green	Flashing	The CEP9 EtherNet/IP Communication Module is online, but with no connections established.	Check the EtherNet/IP master and its scan list for correct scanner configuration.
	Green	Solid	Normal operating state and the CEP9 EtherNet/IP Communication Module is allocated to a master.	No action is required.
	Red	Flashing	One or more EtherNet/IP connections timed out.	Reset the EtherNet/IP master device.
	Red	Solid	Diagnostics test failed on power-up/reset. An internal fault exists.	Cycle power to the unit. If the fault still exists, replace the unit.
			Duplicate EtherNet/IP module address exists. Two modules cannot have the same address.	Change the IP address to a valid setting and reset the device.
			A fatal communication error occurred.	Check Ethernet media for proper installation.
Module Status	None	—	The CEP9 EtherNet/IP Communication Module is not receiving power.	Check the control power connection on the A1 and A2 terminals of the CEP9 EtherNet/IP Control Module.
	Green, Red, Not Illuminated	Flashing (once)	Normal	This is a normal power-up sequence.
	Green	Flashing	The CEP9 EtherNet/IP Communication Module is not being scanned by the EtherNet/IP master.	Check the Ethernet scan list for the correct scanner configuration.
	Green	Solid	Normal operating state, the CEP9 EtherNet/IP Communication Module is allocated to its master.	No action is required.
	Red	Flashing	One or more EtherNet/IP connections timed out.	Reset the CEP9 EtherNet/IP Communication Module.
			The CEP9 Overload Relay is in a fault state.	Reset the CEP9 EtherNet/IP Communication Module or verify the validity of the data in the configuration assembly.
	Red	Solid	Diagnostics test failed on power-up/reset.	Cycle power to the device. If the fault still exists, replace the device.
Link1 or Link2	None	—	The CEP9 EtherNet/IP Communication Module is not properly connected to an Ethernet network.	Check the Ethernet cabling to make sure it is properly installed.
	Green	Flashing	The Ethernet network is properly connected.	No action is required.
	Green	Solid	Communications are occurring on the Ethernet network.	No action is required.

Firmware Updates

Introduction

The purpose of this chapter is to provide detailed information regarding firmware compatibility among the various CEP9 Electronic Overload Relay modules and to provide instructions on how to upgrade firmware for an CEP9 Electronic Overload Relay module.

Firmware Compatibility

The sensing, control, and communication modules of an CEP9 Electronic Overload Relay have their own firmware for the functionality of the module and its subsystems. Each module and its associated subsystems can be upgraded using the ControlFLASH utility which is the same utility used to download firmware into a Logix based controller. Table 336 shows the specific firmware revisions for all CEP9 Electronic Overload Relay modules and subsystems for the three system releases.

Table 336 - CEP9 Firmware Compatibility Table

	CEP9 System Revision	1.034	1.035	2.034
CEP9 Control Module	CEP9-EIO Application	1.002	1.003	2.002
	CEP9-EIO Boot Code	1.005	1.005	1.006
CEP9 Communication Module	CEP9-ECM-ETR Application	1.003	1.003	1.003
	CEP9-ECM-ETR Boot Code	2.001	2.001	2.001
	CEP9-ECM-ETR FPGA	1.008	1.008	1.008
	CEP9-ECM-ETR File System	1.001	1.001	1.001
CEP9 Sensing Module	CEP9-ESM Sensing Module	1.001	1.001	2.002

Table 337 shows which firmware revisions are compatible with the other CEP9 Electronic Overload Relay modules and their associated subsystems.

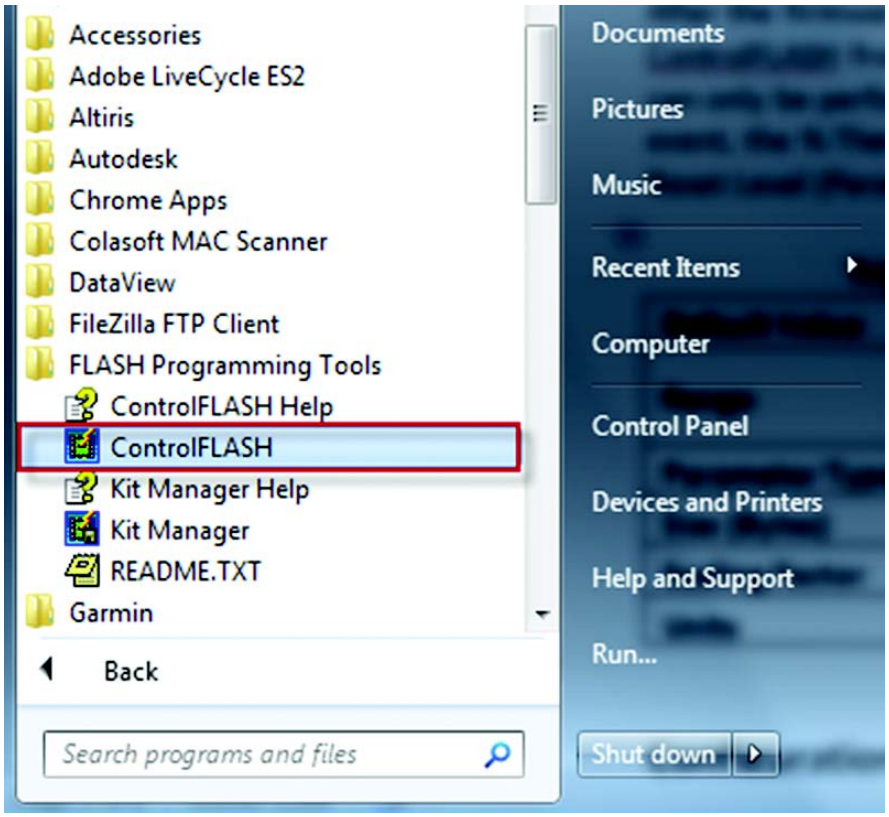
Table 337 - CEP9 Firmware Compatibility Table

	CEP9 Control Module	CEP9-EIO Application	1.002	1.003	2.002
		CEP9-EIO Boot Code	1.005	1.005	1.006
CEP9 Communication Module	CEP9-ECM-ETR Application	1.003	✓	✓	✓
	CEP9-ECM-ETR Boot Code	2.001	✓	✓	✓
	CEP9-ECM-ETR FPGA	1.008	✓	✓	✓
	CEP9-ECM-ETR File System	1.001	✓	✓	✓
CEP9 Sensing Module	CEP9-ESM Sensing Module	1.001	✓	✓	✓
	CEP9-ESM Sensing Module	2.002	—	—	✓

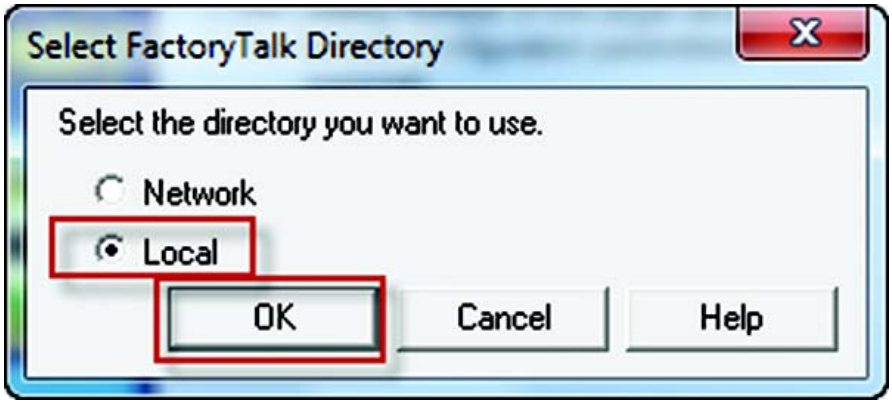
Upgrading Firmware

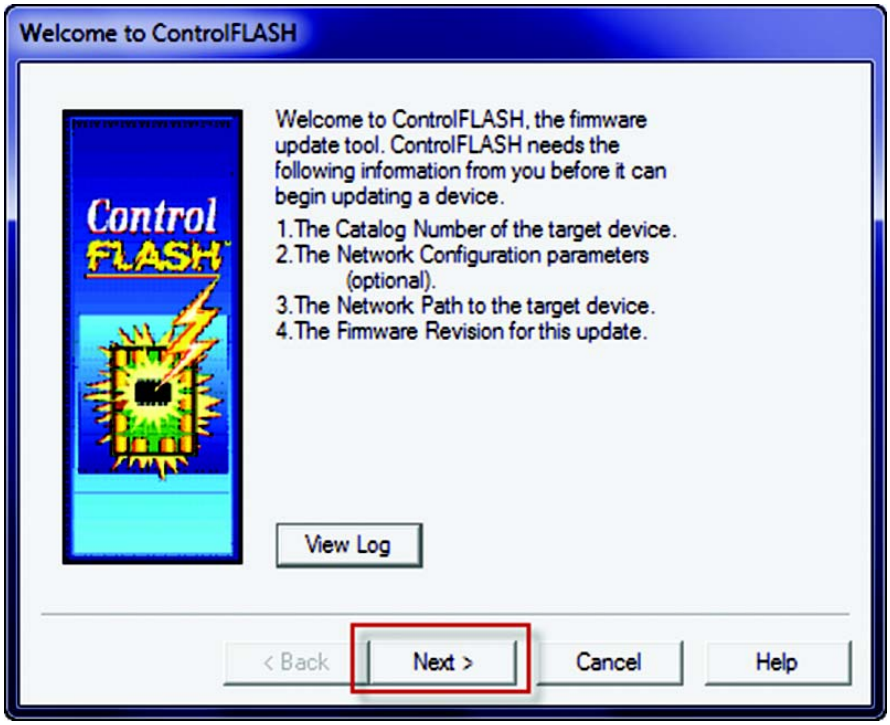
Firmware for the CEP9 Electronic Overload Relay modules and their associated subsystems can be downloaded from the Product Compatibility and Download Center located at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page?.

After the firmware has been downloaded and installed, run the ControlFLASH application by selecting ControlFLASH from the Start menu located at *Start -> FLASH Programming Tools -> ControlFlash* as shown below.



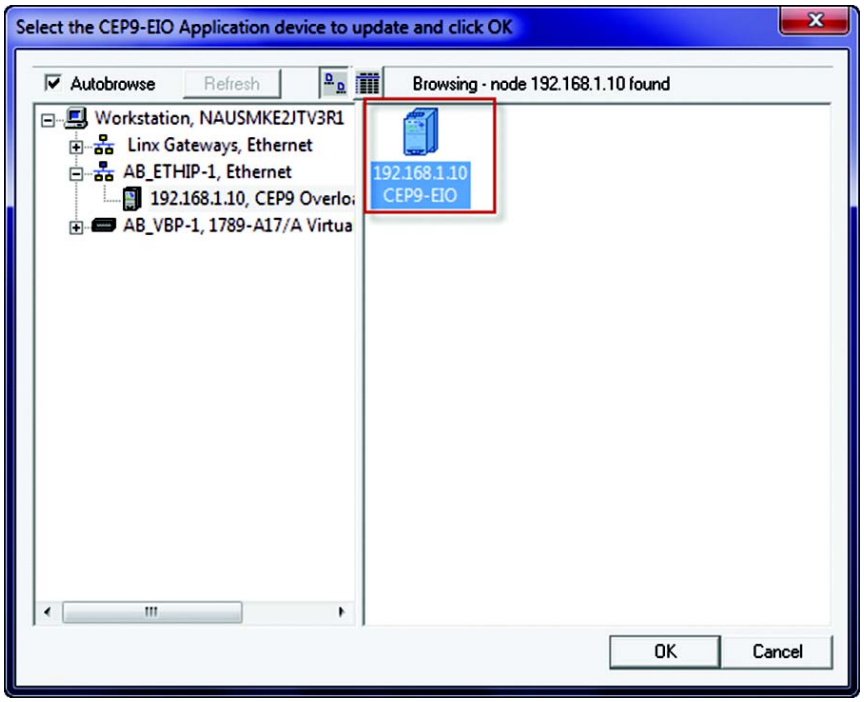
Select the Local directory to locate the ControlFLASH upgrade file and press *Next* to continue.




Welcome to ControlFLASH
Control FLASH
Welcome to ControlFLASH, the firmware update tool. ControlFLASH needs the following information from you before it can begin updating a device.
1.The Catalog Number of the target device.
2.The Network Configuration parameters (optional).
3.The Network Path to the target device.
4.The Firmware Revision for this update.
View Log
< Back
Next >
Cancel
Help

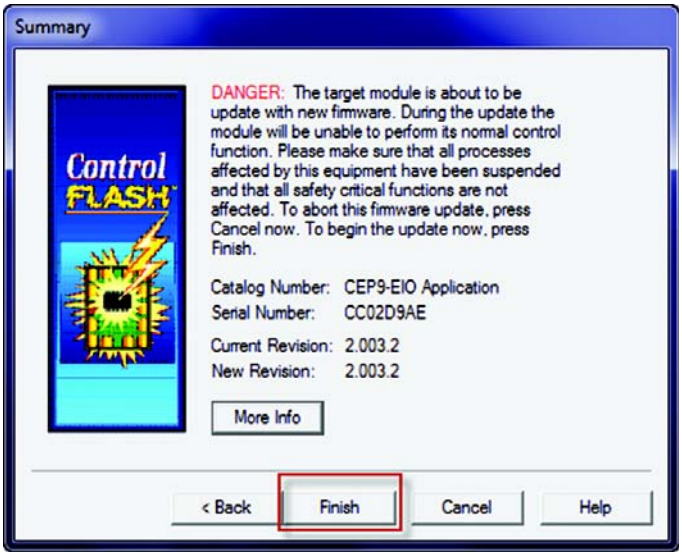
Select the module upgrade file and press *Next*.

Select the specific device to upgrade and press *OK*.

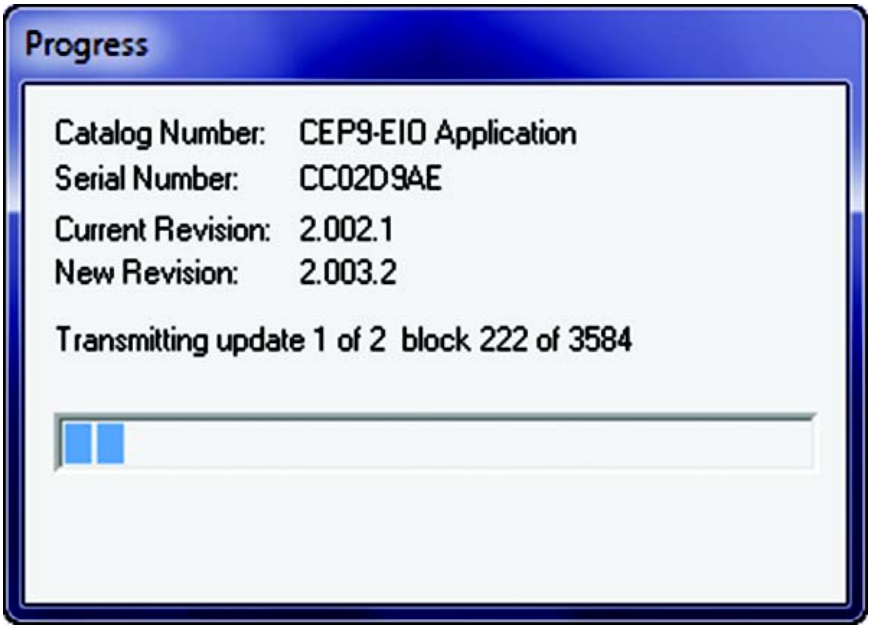


Select the specific firmware revision for the firmware upgrade and press *Next*.

Verify that you want to upgrade the firmware for that specific module subsystem by pressing *Finish*.


Summary
Control FLASH
DANGER: The target module is about to be update with new firmware. During the update the module will be unable to perform its normal control function. Please make sure that all processes affected by this equipment have been suspended and that all safety critical functions are not affected. To abort this firmware update, press Cancel now. To begin the update now, press Finish.
Catalog Number: CEP9-EIO Application
Serial Number: CC02D9AE
Current Revision: 2.003.2
New Revision: 2.003.2
More Info
< Back
Finish
Cancel
Help

The ControlFLASH utility will begin to download the new firmware files. At the end of the download, the device will automatically reset.



When the device finishes its power cycle sequence, a successful firmware upgrade message will be displayed. Press *OK* to finish the firmware upgrade process.

Update Status
Catalog Number: CEP9-EIO Application
Serial Number: CC02D9AE
Current Revision: 2.003.2
New Revision: 2.003.2
Status: Update complete. Please verify this new firmware update before using the target device in its intended application.
OK
View Log
Help

IMPORTANT Do not interrupt power or communications to the device during the firmware upgrade process. Failure of control power or communications could permanently damage the device.

Troubleshooting

Introduction

The purpose of this chapter is to assist in troubleshooting the CEP9 Electronic Overload Relay using its advisory LEDs and diagnostic parameters.

ATTENTION: Servicing energized industrial control equipment can be hazardous. Electrical shock, burns, or unintentional actuation of controlled industrial equipment may cause death or serious injury. For safety of maintenance personnel as well as others who may be exposed to electrical hazards associated with the maintenance activities, follow the local safety-related work practices (for example, the NFPA 70E, Part II, Electrical Safety for Employee Workplaces, in the United States) when working on or near energized equipment. Maintenance personnel must be trained in the safety practices, procedures, and requirements that pertain to their respective job assignments. Do not work alone on energized equipment.

ATTENTION: Do not attempt to defeat or override fault circuits. The cause of a fault indication must be determined and corrected before attempting operation. Failure to correct a control system or mechanical malfunction may result in personal injury and/or equipment damage due to uncontrolled machine system operation.

Advisory LEDs

All CEP9 Electronic Overload Relay Communication Modules and Operator Station have two diagnostic LEDs: Power LED and Trip/Warn LED. The user can use these diagnostic LEDs to help identify the state of the CEP9 Electronic Overload Relay and the reason for the trip or warning event.

Power LED

The CEP9 Electronic Overload Relay Power LED identifies the state of the CEP9 Electronic Overload Relay system.

Table 338 - Power LED

Blinking Green	Device Ready / Operation Mode
Solid Green	Device Active (Current Detected) / Run Mode
Solid Red	Device Error
Blinking Red ❶	Communications Error
Blinking Green/Red ❶	Copy Cat in Progress

❶ Available on Operator Station

Trip/Warn LED

The CEP9 Electronic Overload Relay Power LED identifies the reason for the trip or warning event. The CEP9 Electronic Overload Relay will display a long and short blinking pattern to identify the reason for the trip or warning event.

Table 339 - Trip / Warn LED

Blinking Red	Trip Event
Blinking Yellow	Warning Event

Listed below are the blink patterns for the CEP9 Electronic Overload Relay trip and warning events.

Table 340 - Blink Patterns for Trip/Warn Events

	Code	Long Blink Pattern	Short Blink Pattern
Current	Overload	0	1
	Phase Loss	0	2
	Ground Fault Current	0	3
	Stall	0	4
	Jam	0	5
	Underload	0	6
	Current Imbalance	0	7
	L1 Under Current	0	8
	L2 Under Current	0	9
	L3 Under Current	0	10
	L1 Over Current	0	11
	L2 Over Current	0	12
	L3 Over Current	0	13
	L1 Line Loss	0	14
	L2 Line Loss	0	15
	L3 Line Loss	0	16
Voltage	Under Voltage	1	1
	Over Voltage	1	2
	Voltage Imbalance	1	3
	Phase Rotation Mismatch	1	4
	Under Frequency	1	5
	Over Frequency	1	6

	Code	Long Blink Pattern	Short Blink Pattern
Power	Under kW	2	1
	Over kW	2	2
	Under kVAR Consumed	2	3
	Over kVAR Consumed	2	4
	Under kVAR Generated	2	5
	Over kVAR Generated	2	6
	Under kVA	2	7
	Over kVA	2	8
	Under PF Lagging	2	9
	Over PF Lagging	2	10
	Under PF Leading	2	11
	Over PF Leading	2	12
Control	Test	3	1
	PTC	3	2
	DeviceLogix	3	3
	Operator Station	3	4
	Remote Trip	3	5
	Blocked Start	3	6
	Hardware Fault	3	7
	Configuration	3	8
	Option Match	3	9
	Feedback Timeout	3	10
	Expansion Bus	3	11
	Number Of Starts	3	12
	Operating Hours	3	13
	Non-Volatile Memory	3	14
	Test Mode	3	15

Resetting a Trip

ATTENTION: Resetting a trip will not correct the cause for the trip. Corrective action should be taken before resetting the trip.

The CEP9 Electronic Overload Relay trip condition can be reset by taking one of the following actions:

- Actuating the Blue Trip/Reset button on the CEP9 Electronic Overload Relay Communication Module
- Actuating the Reset button on the CEP9 Electronic Overload Relay Operator Station
- Setting the Trip Reset bit in the CEP9 Electronic Overload Relay's Output Assembly via the communications network
- Actuating a reset signal to one of the assigned digital inputs

- Setting Overload Reset Mode (Parameter 173) to "Automatic" to allow the unit to automatically reset after an overload trip
- Setting Trip Reset (Parameter 163) to a value of 1, "Trip Reset"

IMPORTANT An overload trip cannot be reset until the value of Percent Thermal Capacity Utilized (Parameter 1) is below the value set in Overload Reset Level (Parameter 174).

Trip/Warn LED Troubleshooting Procedures

Trip Description	Possible Cause	Corrective Action
Test Trip	1. Operation of the Test/Reset	1. Operate the Test/Reset button to clear
Overload	1. Motor overloaded	1. Check and correct source of overload (load, mechanical transmission components, motor bearings).
	2. Improper parameter settings	2. Set parameter values to match the motor and application requirements.
Phase Loss	1. Missing supply phase	1. Check for open line (i.e. blown fuse).
	2. Poor electrical connection	2. Check all power terminations from the branch circuit-protecting device down to the motor for proper tightness. Ensure that the overload connection to the contactor is secure.
	3. Contactor operation	3. Inspect contactor for proper operation.
	4. Improper parameter setting	4. Single-phase applications require that Single/Three Phase (Parameter 176) is set to "single phase".
Ground Fault	1. Power conductor or motor winding is shorting to ground	1. Check power conductors and motor windings for low resistance to ground.
	2. Motor winding insulation is decayed	2. Check motor winding insulation for low resistance to ground.
	3. Foreign Object short	3. Check for foreign objects.
	4. External ground fault sensor (core balance current transformer) has improper connection	4. Check cable connections.
Stall	1. Motor has not reached full speed by the end of the Stall Enabld Time (Parameter 249)	1. Check for source of stall (i.e. excessive load, or mechanical transmission component failure).
	2. Improper parameter settings	2. Stall Enabled Time (Parameter 249) is set too low for the application. Check to ensure that FLA Setting (Parameter 171) is set correctly.
Jam	1. Motor current has exceeded the programmed jam level	1. Check for the source of the jam (i.e., excessive load or mechanical transmission component failure).
	2. Improper parameter settings	2. Jam Trip Level (Parameter 253) is set too low for the application. Check to ensure that FLA Setting (Parameter 171) is set correctly.
PTC	1. Motor stator windings overheated	1. Check for source of motor overtemperature (i.e. overload, obstructed cooling, high ambient temperature, excessive starts/hour).
	2. Thermistor leads short-circuited or broken	2. Inspect thermistor leads for short-circuit or open
Current Imbalance	1. Imbalance in incoming power	1. Check power system (i.e. blown fuse).
	2. Motor winding imbalance	2. Repair motor, or if acceptable, raise value of Current Imbalance Trip Level (Parameter 261), CI Trip Level
	3. Motor idling	3. Raise value of Current Imbalance Trip Level (Parameter 261) to an acceptable level.
	4. Contactor or circuit breaker operation	4. Inspect contactor and circuit breaker for proper operation.

Trip Description	Possible Cause	Corrective Action
Non-Volatile Storage Fault	1. Firmware Downgrade corrupted: Non-volatile memory	1.Execute the Clear Command to the operating Statistics, History Logs, and % TCU
	2. Internal product failure	2. Consult the factory.
Hardware Fault	1. Firmware of sensing module is not compatible with control module firmware	1. Verify firmware revisions of control module and sensing module 2. Upgrade firmware of control module to v2.0 or higher
	2. Hardware configuration failure	3. Consult the factory. 4. Verify that the Sensing, Control, and Communication Module are connected properly. 5. Verify that connection pins between sensing module and control module are not bent.
Configuration Fault	1. Single/Three Phase (Parameter 176) is set to "Single Phase" and current is being sensed in phase L3 during motor operation.	1. For three-phase applications, Single/Three Phase (Parameter 176) should be set to “Three-Phase”; for single-phase applications, verify that current is flowing through L1 and L2 only.
	2. Operating Mode "Overload (Network)" does not have an assigned Trip Relay	2. Verify that one of the Output Assignments (Parameters 202-204) is configured as a "Trip Relay"
	3. Illegal configuration value	3. Review Invalid Configuration Parameter (Parameter 38) and Invalid Configuration Cause (Parameter 39) to identify which configuration parameter is illegal and the reason why.
Remote Trip	1. Contact closure of remote sensor (e.g., vibration switch).	1. Take corrective action to address the issue that caused the sensor to actuate.
		2. Check sensor for proper operation.
		3. Check wiring.
Total Starts Warning	1. Starts Counter (Parameter 29) is equal to or greater than the value set in Total Starts (Parameter 207)	1. Set Clear Command (Parameter 165) to "Clear Operating Statistics" to reset Starts Counter (Parameter 29)
Total Operating Hours Warning	1. Operating Time (Parameter 28) is equal to or greater than the value set in Total Operating Hours (Parameter 208)	1. Clear Command (Parameter 165) to "Clear Operating Statistics" to reset Operating Time (Parameter 28)
Blocked Start	1. The number of starts count within the past hour period equals the value set in the Starts Per Hour (Parameter 205)	1. Check Time to Start (Parameter 31) and wait that amount of time, or change the configuration to allow more starts/hour.
	2. The time expired since the most recent start is less than the value set in the Starts Interval (Parameter 206)	2. Check Time to Start (Parameter 31) and wait that amount of time, or change the configuration to shorten the interval between starts.

Specifications

Electrical Specifications

Table 341 - Motor/Load Ratings

Terminals	1/L1, 3/L2, 5/L3, 2/T1, 4/T2, 6/T3
Rated Insulation Voltage (U_i)	690V AC
Rated Operating Voltage (U_e) IEC: UL:	 690V AC 600V AC
Rated Impulse Voltage (U_{imp})	6 kV
Rated Operating Current (I_e)	See Catalog Number Explanation
Rated Frequency	45...65 Hz ❶
Short Circuit Ratings	See Short-Circuit Ratings on page 44
Number of Poles	3
Application	Single-phase or Three-phase

❶ Exception: Any CEP9 Overload Relay that uses an external ground fault sensor is limited to 50/60 Hz detection.

Table 342 - Power Supply Ratings

Rated Supply Voltage (U_s)	24V DC	120V AC	240V AC
Operating Range	11…30V DC	85…132V AC	159…265V AC
Maximum Inrush Current	3 A		
Maximum Power Consumption CEP9: CEP9 with expansion:	 6 W 8 W		
Maximum Power Interruption Time V_{min}: V_{max}:	 5 ms 5 ms	 10 ms 10 ms	 10 ms 10 ms

Table 343 - Output Relay Ratings (Control Module and Expansion Digital Module)

Terminals Relay 0: Relay 1: Relay 2:	 R03/R04 R13/R14 R23/R24
Type of Contacts	Form A SPST - NO
Rated Thermal Current (I_{the})	5 A
Rated Insulation Voltage (U_i)	300V AC
Rated Operating Voltage (U_e)	250V AC
Rated Operating Current (I_e)	3 A (@120V AC), 1.5 A (@240V AC)
	0.25 A (@110V DC), 0.1 A (@220V DC)
Minimum Operating Current	10 mA @ 5V DC
Rating Designation	B300

Table 343 - Output Relay Ratings (Control Module and Expansion Digital Module)

Utilization Category	AC-15
Resistive Load Rating (p.f. = 1.0)	5 A, 250V AC 5 A, 30V DC
Inductive Load Rating (p.f. = 0.4) (L/R = 7 ms)	2 A, 250V AC 2 A, 30V DC
Short Circuit Current Rating	1,000 A
Recommended Control Circuit Fuse	KTK-R-6 (6 A, 600 V)
Rated Number of Operations Relay 0, Relay 1, and Relay 2: W/CA7-09…CA7-55 W/CA7-60…CA7-97	 5,000,000 2,500,000 1,000,000 300,000

Table 344 - Input Ratings (Control Module and Expansion Digital Module)

Terminals Input 0: Input 1: Input 2: Input 3: Input 4: Input 5:	IN0 IN1 IN2 IN3 IN4 IN5		
Supply Voltage	24V DC	120V AC	240V AC
Type of Inputs	Current Sinking		
On-State Voltage	11V DC	74V AC	159V AC
On-State Current (turn-on)	2 mA	5 mA	5 mA
Off-State Voltage	5V DC	20V AC	40V AC
Off-State Current	1.5 mA	2.5 mA	2.5 mA
Transition Voltage	5...11V DC	20…74V AC	40…159V AC
Transition Current	1.5...2.0 mA	2.5…5 mA	2.5…5 mA

Table 345 - Thermistor/PTC Input Ratings (PTC only)

Terminals	IT1, IT2
Type of Control Unit	Mark A
Maximum Number of Sensors	6
Maximum Cold Resistance of PTC Sensor Chain	1500 Ω
Trip Resistance	3400 Ω ± 150 Ω
Reset Resistance	1600 Ω ± 100 Ω
Short-circuit Trip Resistance	25 Ω ± 10 Ω
Maximum Voltage @ PTC Terminals (R_{PTC} = 4 kΩ)	7.5V DC
Maximum Voltage @ PTC Terminals (R_{PTC} =open)	30V DC
Response Time	800 ms

Low Voltage Directive

The CEP9 Electronic Overload Relay expansion digital modules are tested to comply with EN60947-5-1 Low-voltage switchgear and controlgear Part 5-1: Control circuit devices and switching elements.

Table 346 - Expansion Digital I/O Modules

Expansion Digital I/O Modules	CEP9-EXP-DIO-42-24D	CEP9-EXP-DIO-42-120	CEP9-EXP-DIO-42-240
Digital Output Rated Operational Voltage (U_e):	250V AC	250V AC	250V AC
Digital Output Rated Insulation Voltage (U_i):	2000Vrms for 1s	2000Vrms for 1s	2000Vrms for 1s
Rated Impulse Withstand Voltage (U_{imp}):	NA	NA	NA
Conditional Short Circuit Current:	1000 A	1000 A	1000 A
Recommended Control Circuit Fuse:	KTK-R (6 A, 600V)	KTK-R (6 A, 600V)	KTK-R (6 A, 600V)
Utilization Category:	AC15, DC13	AC15, DC13	AC15, DC13
Pollution Degree:	3	3	3

Table 347 - Expansion Power Supply Modules

Expansion Power Supply Modules	CEP9-EXP-PS-AC
Rated Operational Voltage (U_e):	100…250V AC
Rated Insulation Voltage (U_i):	2640Vrms for 1s
Rated Impulse Withstand Voltage (U_{imp}):	4 kV
Conditional Short Circuit Current:	NA
Protection Against Short Circuits:	NA
Utilization Category:	NA
Pollution Degree:	3

Environmental Specifications

Table 348 - Environmental Specifications

Ambient Temperature Storage Operating (Open) (Enclosed)	 –40…+85 °C (–40…+185 °F) –20…+55 °C (–4…+131 °F)❷❸ –20…+40 °C (–4…+104 °F)❸❹
Humidity Operating Damp Heat – Steady State (per IEC 68-2-3) Damp Heat – Cyclic (per IEC 68-2-30)	 5…95% Non-condensing 92% r.h., 40 °C (104 °F), 56 days 93% r.h., 25 °C/40 °C (77 °F/104 °F), 21 Cycles
Cooling Method	Natural Convection
Vibration (per IEC 68-2-6)	2.5G operating, 5 G non-operating
Shock (per IEC 68-2-27)	30 G
Maximum Altitude	2000 m ❶
Pollution Environment	Pollution Degree 3
Terminal Marking	EN 50012
Degree of Protection	IP20

❶ Current ratings must be derated at altitudes greater than 2000 m
❷ Temperature rating based on 120V AC control module with 1 A going through relays 0, 1, and 2.
❸ Temperature rating based on 240V DC control module with four digital inputs active and 0.2 A going through relays 0, 1, and 2.
❹ Temperature rating based on 120V AC or 240V AC control module with 5A going through relays 0, 1, and 2.

NOTE: The CEP9 Electronic Overload Relay expansion power supplies (Cat. Nos. CEP9-EXP-PS-AC and CEP9-EXP-PS-DC) surrounding air temperature must not exceed 55 °C (131 °F).

Table 349 - Temperature Derating

	Control Module Voltage	Relay 0 Current	Relay 1 Current	Relay 2 Current	Number of Digital Inputs Active	Operating Temperature Range
Open Application	120/240V AC	1.0 A	1.0 A	1.0 A	4	-20…+55 °C (-4…+131 °F)
		5.0 A	1.0 A	1.0 A	4	-20…+50 °C (-4…+122 °F)
	24V DC	0.2 A	0.2 A	0.2 A	4	-20…+55 °C (-4…+131 °F)
		0.2 A	0.2 A	0.2 A	6	-20…+50 °C (-4…+122 °F)
		5.0 A	1.0 A	1.0 A	6	-20…+30 °C (-4…+86 °F)
Enclosed Application	120/240V AC	5.0 A	5.0 A	5.0 A	4	-20…+40 °C (-4…+104 °F)
	24V DC	0.2 A	0.2 A	0.2 A	4	-20…+40 °C (-4…+104 °F)
		5.0 A	1.0 A	1.0 A	6	-20…+30 °C (-4…+86 °F)

Electromagnetic Compatibility Specifications

Table 350 - Electromagnetic Compatibility Specifications

Electrostatic Discharge Immunity Test Level: Performance Criteria:	 8kV Air Discharge 6kV Contact Discharge 1 ❶❷
RF Immunity Test Level: Performance Criteria:	 10V/m 1 ❶❷
Electrical Fast Transient/Burst Immunity Test Level: Performance Criteria:	 4kV (Power) 2kV (Control & Comm) 1 ❶❷
Surge Immunity Test Level: Performance Criteria:	 2kV (L-E) 1kV (L-L) 1 ❶❷
Radiated Emissions	Class A
Conducted Emissions	Class A

❶Performance Criteria 1 requires the DUT to experience no degradation or loss of performance.
❷Environment 2.

Protection

Table 351 - Protection

	Trip	Warning
Overload	Yes	Yes
Phase Loss	Yes	No
Ground Fault ❶	Yes	Yes
Stall	Yes	No
Jam	Yes	Yes
Underload	Yes	Yes
Thermistor (PTC)	Yes	Yes
Current Imbalance	Yes	Yes
Communication Fault	Yes	Yes
Communication Idle	Yes	Yes
Remote Trip	Yes	No
Blocked Start/Start Inhibit	Yes	No
Under Voltage L-L	Yes	Yes
Over Voltage L-L	Yes	Yes
Voltage Unbalance	Yes	Yes
Phase Rotation	Yes	Yes
Under Frequency	Yes	Yes
Over Frequency	Yes	Yes
Under Real Power (kW)	Yes	Yes
Over Real Power (kW)	Yes	Yes
Under Reactive Power Consumed (+kVAR)	Yes	Yes
Over Reactive Power Consumed (+kVAR)	Yes	Yes
Under Reactive Power Generated (-kVAR)	Yes	Yes
Over Reactive Power Generated (-kVAR)	Yes	Yes
Under Apparent Power (kVA)	Yes	Yes
Over Apparent Power (kVA)	Yes	Yes
Under Power Factor Lagging (-PF)	Yes	Yes
Over Power Factor Lagging (-PF)	Yes	Yes
Under Power Factor Leading (+PF)	Yes	Yes
Over Power Factor Leading (+PF)	Yes	Yes
Power Value Overflow (kW, kVAR or KVA)	Yes	Yes

Table 352 - Overload Protection

Type of Relay	Ambient Compensated Time-Delay Phase Loss Sensitive
Nature of Relay	Solid-State
FLA Setting	See Full Load Amps Setting on page 83
Trip Rating	120% FLA
Trip Class	5…30
Reset Mode	Automatic or Manual
Overload Reset Level	1…100% TCU

Table 353 - Ground Fault Protection (External Ground Fault Module)

Type	Core Balanced
Intended Use	Equipment Protection
Classification (Per UL 1053)	Class I
Protection Range	20…100 mA
	100…500 mA
	200 mA…1.0 A
	1.0…5.0 A
Trip & Warning Time Delay	0.1…25.0 s
Protection Inhibit Time	0…250 s

Accuracy

Metering

The CEP9 Electronic Overload Relay metering accuracy is listed below:

Table 354 - Metering Accuracy

Current	±2% of Sensing Module Current Range
Voltage	±2% of Sensing Module Voltage Range
Power	±5%

Protection Timers

All CEP9 Electronic Overload Relay trip timers shall have a resolution of ±0.1 s or 0.1 s/25 s (whichever is greater).

Notes:

Parameter List

Overview

This appendix lists all accessible parameters of the CEP9™ overload relay in numerical order.

The setting range for each parameter is provided to assist especially for applications where it is desirable to set values from a logic controller via a network connection.

Information values provided include the following:

Value	Function
Setting Range	Indicated as raw numerical values.
Scale Factor	Indicate the decimal precision associated with each parameter. This must be given close attention when writing or reading values.
Default	Indicate the factory pre-programmed values.

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Monitor	1	ThermUtilizedPct	% Thermal Capacity Used	USINT	1	1	0	100	0	%
	2	OLTimeToTrip	Time until an overload trip	UINT	2	1	0	9999	0	Sec
	3	OLTimeToReset	Time until OL trip can be reset	UINT	2	1	0	9999	0	Sec
	4	TripStsCurrent	Trip Status bits for Current	UINT	2	1	Bit0= OverloadTrip Bit1= PhaseLossTrip Bit2= GroundFaultTrip Bit3= StallTrip Bit4= JamTrip Bit5= UnderloadTrip Bit6= CurrentImbalTrip Bit7= L1UnderCurrTrip Bit8= L2UnderCurrTrip Bit9= L3UnderCurrTrip Bit10= L1OverCurrenTrip Bit11= L2OverCurrenTrip Bit12= L3OverCurrenTrip Bit13= L1LineLossTrip Bit14= L2LineLossTrip Bit15= L3LineLossTrip		0	
	5	TripStsVoltage	Trip Status bits for Voltage	UINT	2	1	Bit0= UnderVoltageTrip Bit1= OvervoltageTrip Bit2= VoltageUnbalTrip Bit3= PhaseRotationTrp Bit4= UnderFreqTrip Bit5= OverFreqTrip		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Monitor (continued)	6	TripStsPower	Trip Status bits for Power	UINT	2	1	Bit0= UnderKWTrip Bit1= OverKWTrip Bit2= UnderKVARConTrip Bit3= OverKVARConTrip Bit4= UnderKVARGenTrip Bit5= OverKVARGenTrip Bit6= UnderKVATrip Bit7= OverKVATrip Bit8= UnderPFLagTrip Bit9= OverPFLagTrip Bit10= UnderPFLeadTrip Bit11= OverPFLeadTrip		0	
	7	TripStsControl	Trip Status bits for Control	UINT	2	1	Bit0= TestTrip Bit1= PTCTrip Bit2= DLXTrip Bit3= OperStationTrip Bit4= RemoteTrip Bit5= BlockedStartTrip Bit6= HardwareFltTrip Bit7= ConfigTrip Bit8= OptionMatchTrip Bit9= DLXFBTimeoutTrip Bit10= ExpansionBusTrip Bit11= Reserved Bit12 =Reserved Bit13= NVSTrip Bit 14=TestMode Trip		0	
	8	TripStsAnalog	Trip Status bits for Analog	UINT	2	1	Bit0= InAnMod1Ch00Trip Bit1= InAnMod1Ch01Trip Bit2= InAnMod1Ch02Trip Bit3= InAnMod2Ch00Trip Bit4= InAnMod2Ch01Trip Bit5= InAnMod2Ch01Trip Bit6= InAnMod3Ch00Trip Bit7= InAnMod3Ch01Trip Bit8= InAnMod3Ch02Trip Bit9= InAnMod4Ch00Trip Bit10= InAnMod4Ch01Trip Bit11= InAnMod4Ch02Trip		0	
	9	Reserved								
	10	WarnStsCurrent	Warning Status bits for Current	UINT	2	1	Bit0= OverloadWarning Bit1= Reserved Bit2= GroundFltWarning Bit3= Reserved Bit4= JamWarning Bit5= UnderloadWarning Bit6= CurrentImbalWarn Bit7= L1UnderCurrWarn Bit8= L2UnderCurrWarn Bit9= L3UnderCurrWarn Bit10= L1OverCurrenWarn Bit11= L2OverCurrenWarn Bit12= L3OverCurrenWarn Bit13= L1LineLossWarn Bit14= L2LineLossWarn Bit15= L3LineLossWarn		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Monitor (continued)	11	WarnStsVoltage	Warning Status bits for Voltage	UINT	2	1	Bit0= UnderVoltageWarn Bit1= OvervoltageWarn Bit2= VoltageUnbalWarn Bit3= PhaseRotationWrn Bit4= UnderFreqWarning Bit5= OverFreqWarning		0	
	12	WarnStsPower	Warning Status bits for Power	UINT	2	1	Bit0= UnderKWWarning Bit1= OverKWWarning Bit2= UnderKVARConWarn Bit3= OverKVARConWarn Bit4= UnderKVARGenWarn Bit5= OverKVARGenWarn Bit6= UnderKVAWarning Bit7= OverKVAWarning Bit8= UnderPFLagWarn Bit9= OverPFLagWarn Bit10= UnderPFLeadWarn Bit11= OverPFLeadWarn		0	
	13	WarnStsControl	Warning Status bits for Control	UINT	2	1	Bit0= Reserved Bit1= PTCWarning Bit2= DLXWarning Bit3= Reserved Bit4= Reserved Bit5= Reserved Bit6= Reserved Bit7= ConfigWarning Bit8= OptionMatchWarn Bit9= DLXFBTimeoutWarn Bit10= ExpansionBusWarn Bit11= PMNumberOfStarts Bit12= PMOperatingHours		0	
	14	WarnStsAnalog	Warning Status bits for Analog	UINT	2	1	Bit0= InAnMod1Ch00Warn Bit1= InAnMod1Ch01Warn Bit2= InAnMod1Ch02Warn Bit3= InAnMod2Ch00Warn Bit4= InAnMod2Ch01Warn Bit5= InAnMod2Ch02Warn Bit6= InAnMod3Ch00Warn Bit7= InAnMod3Ch01Warn Bit8= InAnMod3Ch02Warn Bit9= InAnMod4Ch00Warn Bit10= InAnMod4Ch01Warn Bit11= InAnMod4Ch02Warn		0	
	15	Reserved								
	16	InputStatus0	Status of Digital Inputs	UINT	2	1	Bit0= InputPt00 Bit1= InputPt01 Bit2= InputPt02 Bit3= InputPt03 Bit4= InputPt04 Bit5= InputPt05		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Monitor (continued)	17	InputStatus1	Status of Digital Expansion Module Inputs	UINT	2	1	Bit0= InputDigMod1Pt00 Bit1= InputDigMod1Pt01 Bit2= InputDigMod1Pt02 Bit3= InputDigMod1Pt03 Bit4= InputDigMod2Pt00 Bit5= InputDigMod2Pt01 Bit6= InputDigMod2Pt02 Bit7=1nputDigMod2Pt03 Bit8= InputDigMod3Pt00 Bit9= InputDigMod3Pt01 Bit10= InputDigMod3Pt02 Bit11= InputDigMod3Pt03 Bit12= InputDigMod4Pt00 Bit13= InputDigMod4Pt01 Bit14= InputDigMod4Pt02 Bit15= InputDigMod4Pt03		0	
	18	OutputStatus	Status of Digital Outputs	UINT	2	1	Bit0= OutputPt00 Bit1= OutputPt01 Bit2= OutputPt02 Bit3= OutDigMod1Pt00 Bit4= OutDigMod1Pt01 Bit5= OutDigMod2Pt00 Bit6= OutDigMod2Pt01 Bit7= OutDigMod3Pt00 Bit8= OutDigMod3Pt01 Bit9= OutDigMod4Pt00 Bit10= OutDigMod4Pt01		0	
	19	OpStationStatus	Status of Operator Station Buttons and LEDs	UINT	2	1	Bit0= OpStationStart1 Bit1= OpStationStart2 Bit2= OSLocalRemote Bit3= OpStationStop Bit4= OpStationReset Bit5= Reserved Bit6= Reserved Bit7= Reserved Bit8= OSLED1Green Bit9= OSLED2Green Bit10= OSLED3Amber Bit11= OSLED3Red Bit12= OSLED4Red		0	
	20	DeviceStatus0	Device Status bits	UINT	2	1	Bit0= TripPresent Bit1= WarningPresent Bit2= InvalidConfig Bit3= CurrentPresent Bit4= GFCurrentPresent Bit5= VoltagePresent Bit6= EmergencyStartEn Bit7= DeviceLogixEn Bit8= FeebckTimeoutEn Bit9= OperatorStation Bit10= VoltageSensing Bit11= InternGFSensing Bit12= ExternGFSensing Bit13= PTCSensing Bit14= Ready Bit 15=Admin Mode Active		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Monitor (continued)	21	DeviceStatus1	Device Status bits	UINT	2	1	Bit0= 24VoltControl Bit1= 120VoltControl Bit2= 240VoltControl Bit3= CurrentSense30A Bit4= CurrentSense60A Bit5= CurrentSense100A Bit6= CurrentSense200A Bit7= DigitalModule1 Bit8= DigitalModule2 Bit9= DigitalModule3 Bit10= DigitalModule4 Bit11= AnalogModule1 Bit12= AnalogModule2 Bit13= AnalogModule3 Bit14= AnalogModule4		0	
	22	Firmware	Firmware Revision Number	UINT	2	1000	0	65535	1001	
	23	ControlModuleID	Control Module Type Detected	USINT	1	1	0= Unknown 1= 6In3Out24VDC 2= 4In3Out120VAC 3= 4In3Out240VAC 4= 4In2OutGFPTC24V 5= 2In2OutGFPTC120V 6= 2In2OutGFPTC240V		0	
	24	SensingModuleID	Sensing Module Types Detected	USINT	1	1	0= Unknown 1= VIGPt5to30Amp 2= VIG6to60Amp 3= VIG10to100Amp 4= VIG20to200Amp 5= IGPt5to30Amp 6= IG6to60Amp 7= IG10to100Amp 8= IG20to200Amp 9= IPt5to30Amp 10= I6to60Amp 11= I10to100Amp 12= I20to200Amp		0	
	25	OperStationID	Operator Station Types Detected	USINT	1	1	0= Unknown 1= NoStation 2= ControlStation 3= DiagStation		0	
	26	DigitalModuleID	Expansion Digital Module Types Detected	UINT	2	1	Bit0= DigitalMod1[0] Bit1= DigitalMod1[1] Bit2= DigitalMod1[2] Bit3= DigitalMod2[0] Bit4= DigitalMod2[1] Bit5= DigitalMod2[2] Bit6= DigitalMod3[0] Bit7= DigitalMod3[1] Bit8= DigitalMod3[2] Bit9= DigitalMod4[0] Bit10= DigitalMod4[1] Bit11= DigitalMod4[2]		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Monitor (continued)	27	AnalogModuleID	Expansion Bus Analog Module Types	UINT	2	1	Bit0= AnalogMod1[0] Bit1= AnalogMod1[1] Bit2= AnalogMod2[0] Bit3= AnalogMod2[1] Bit4= AnalogMod3[0] Bit5= AnalogMod3[1] Bit6= AnalogMod4[0] Bit7= AnalogMod4[1]		0	
	28	OperatingTime	Time unit has been powered on	UINT	2	1	0	65535	0	Hrs
	29	StartsCounter	Number of starts	UINT	2	1	0	65535	0	
	30	Starts Available	Number of Starts Available	USINT	1	1	0	120	0	
	31	TimeToStart	The Time to Start	UINT	2	1	0	3600	0	Sec
	32	Year	Virtual RTC Year	UINT	2	1	0	9999	0	
	33	Month	Virtual RTC Month	UINT	2	1	0	12	0	
	34	Day	Virtual RTC Day	UINT	2	1	0	31	0	
	35	Hour	Virtual RTC Hour	UINT	2	1	0	23	0	
	36	Minute	Virtual RTC Minute	UINT	2	1	0	59	0	
	37	Second	Virtual RTC Second	UINT	2	1	0	59	0	
	38	InvalidCfgParam	Number of incorrectly configured parameter	UINT	2	1	0	9999	0	
	39	InvalidCfgCause	Description of error	USINT	1	1	0=NoError 1=ValueOverMax 2=Value UnderMin 3=IllegalValue 4=L3CurrentDetected 5=CopyCat Error 6-50 = Reserved		0	
	40	Reserved								
	41	Reserved								
	42	Reserved								
Current Monitor	43	L1Current	The actual L1 Phase Current.	DINT	4	100	0	2000000000	0	Amps
	44	L2Current	The actual L2 Phase Current.	DINT	4	100	0	2000000000	0	Amps
	45	L3Current	The actual L3 Phase Current.	DINT	4	100	0	2000000000	0	Amps
	46	AverageCurrent	Average of Phase Currents.	DINT	4	100	0	2000000000	0	Amps
	47	L1PercentFLA	L1 Current in %FLA	UINT	2	10	0	10000	0	%
	48	L2PercentFLA	L2 Current in %FLA	UINT	2	10	0	10000	0	%
	49	L3PercentFLA	L3 Current in %FLA	UINT	2	10	0	10000	0	%
	50	AvgPercentFLA	Average Current in %FLA	UINT	2	10	0	10000	0	%
	51	GFCurrent	The Ground Fault Current.	UINT	2	100	0	9999	0	Amps
	52	CurrentImbal	Percent Current Imbalance	USINT	1	1	0	200	0	%
Voltage Monitor	53	L1toL2Voltage	3 Phase RMS Voltage Line-Line	UINT	2	10	0	65535	0	Volt
	54	L2toL3Voltage	3 Phase RMS Voltage Line-Line	UINT	2	10	0	65535	0	Volt
	55	L3toL1Voltage	3 Phase RMS Voltage Line-Line	UINT	2	10	0	65535	0	Volt
	56	AvgVoltageLtoL	Average RMS Voltage Line-Line	UINT	2	10	0	65535	0	Volt
	57	L1toNVoltage	3 Phase RMS Voltage Line-Neutral	UINT	2	10	0	65535	0	Volt
	58	L2toNVoltage	3 Phase RMS Voltage Line-Neutral	UINT	2	10	0	65535	0	Volt
	59	L3toNVoltage	3 Phase RMS Voltage Line-Neutral	UINT	2	10	0	65535	0	Volt

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Voltage Monitor (Continued)	60	AvgVoltageLtoN	Average RMS Voltage Line-Neutral	UINT	2	10	0	65535	0	Volt
	61	VoltageUnbalance	Voltage Unbalance	USINT	1	1	0	255	0	%
	62	VoltageFrequency	Voltage Frequency	UINT	2	10	0	2500	0	Hz
	63	VPhaseRotation	Voltage Phase Rotation (ABC or ACB)	UINT	2	1	0= NoRotation 1= ABC 2= ACB		0	
Power Monitor	64	L1RealPower	Phase L1 Real Power.	DINT	4	1000	-2000000000	2000000000	0	kW
	65	L2RealPower	Phase L2 Real Power.	DINT	4	1000	-2000000000	2000000000	0	kW
	66	L3RealPower	Phase L3 Real Power.	DINT	4	1000	-2000000000	2000000000	0	kW
	67	TotalRealPower	Total Real Power	DINT	4	1000	-2000000000	2000000000	0	kW
	68	L1ReactivePower	Phase L1 Reactive Power	DINT	4	1000	-2000000000	2000000000	0	kVAR
	69	L2ReactivePower	Phase L2 Reactive Power	DINT	4	1000	-2000000000	2000000000	0	kVAR
	70	L3ReactivePower	Phase L3 Reactive Power	DINT	4	1000	-2000000000	2000000000	0	kVAR
	71	TotalReactivePwr	Total Reactive Power	DINT	4	1000	-2000000000	2000000000	0	kVAR
	72	L1ApparentPower	Phase L1 Apparent Power	DINT	4	1000	0	2000000000	0	kVA
	73	L2ApparentPower	Phase L2 Apparent Power	DINT	4	1000	0	2000000000	0	kVA
	74	L3ApparentPower	Phase L3 Apparent Power	DINT	4	1000	0	2000000000	0	kVA
	75	TotalApparentPwr	Total Apparent Power	DINT	4	1000	0	2000000000	0	kVA
	76	L1PowerFactor	Phase L1 True Power Factor (PF)	INT	2	10	-1000	1000	0	%
	77	L2PowerFactor	Phase L2 True Power Factor (PF)	INT	2	10	-1000	1000	0	%
	78	L3PowerFactor	Phase L3 True Power Factor (PF)	INT	2	10	-1000	1000	0	%
	79	TotalPowerFactor	Total True Power Factor (PF)	INT	2	10	-1000	1000	0	%
Energy Monitoring	80	kWhTimes10E9	Total Real Energy (kWh) Word 10^9	INT	2	1	-999	999	0	
	81	kWhTimes10E6	Total Real Energy (kWh) Word 10^6	INT	2	1	-999	999	0	
	82	kWhTimes10E3	Total Real Energy (kWh) Word 10^3	INT	2	1	-999	999	0	
	83	kWhTimes10E0	Total Real Energy (kWh) Word 10^0	INT	2	1	-999	999	0	
	84	kWhTimes10E-3	Total Real Energy (kWh) Word 10^-3	INT	2	1	-999	999	0	
	85	kVARhCon10E9	Total Reactive Energy Consumed (kVARh) Word 10^9	INT	2	1	-999	999	0	
	86	kVARhCon10E6	Total Reactive Energy Consumed (kVARh) Word 10^6	INT	2	1	-999	999	0	
	87	kVARhCon10E3	Total Reactive Energy Consumed (kVARh) Word 10^3	INT	2	1	-999	999	0	
	88	kVARhCon10E0	Total Reactive Energy Consumed (kVARh) Word 10^0	INT	2	1	-999	999	0	
	89	kVARhCon10E-3	Total Reactive Energy Consumed (kVARh) Word 10^-3	INT	2	1	-999	999	0	
	90	kVARhGen10E9	Total Reactive Energy Generated (kVARh) Word 10^9	INT	2	1	-999	999	0	
	91	kVARhGen10E6	Total Reactive Energy Generated (kVARh) Word 10^6	INT	2	1	-999	999	0	
	92	kVARhGen10E3	Total Reactive Energy Generated (kVARh) Word 10^3	INT	2	1	-999	999	0	
	93	kVARhGen10E0	Total Reactive Energy Generated (kVARh) Word 10^0	INT	2	1	-999	999	0	
	94	kVARhGen10E-3	Total Reactive Energy Generated (kVARh) Word 10^-3	INT	2	1	-999	999	0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Energy Monitoring (Continued)	95	kVARhNet10E9	Total Reactive Energy Net (kVARh) Word 10^9	INT	2	1	-999	999	0	
	96	kVARhNet10E6	Total Reactive Energy Net (kVARh) Word 10^6	INT	2	1	-999	999	0	
	97	kVARhNet10E3	Total Reactive Energy Net (kVARh) Word 10^3	INT	2	1	-999	999	0	
	98	kVARh Net 10E0	Total Reactive Energy Net (kVARh) Word 10^0	INT	2	1	-999	999	0	
	99	kVARhNet10E-3	Total Reactive Energy Net (kVARh) Word 10^-3	INT	2	1	-999	999	0	
	100	kVAhTimes10E9	Total Apparent Energy (kVAh) Word 10^9	INT	2	1	-999	999	0	
	101	kVAhTimes10E6	Total Apparent Energy (kVAh) Word 10^6	INT	2	1	-999	999	0	
	102	kVAhTimes10E3	Total Apparent Energy (kVAh) Word 10^3	INT	2	1	-999	999	0	
	103	kVAhTimes10E0	Total Apparent Energy (kVAh) Word 10^0	INT	2	1	-999	999	0	
	104	kVAhTimes10E-3	Total Apparent Energy (kVAh) Word 10^-3	INT	2	1	-999	999	0	
	105	kWDemand	Real Power Demand	DINT	4	1000	-2000000000	2000000000	0	kW
	106	MaxkWDemand	Maximum Real Power Demand	DINT	4	1000	-2000000000	2000000000	0	kW
	107	VARDemand	Reactive Power Demand	DINT	4	1000	-2000000000	2000000000	0	kVAR
	108	MaxVARDemand	Maximum Reactive Demand	DINT	4	1000	-2000000000	2000000000	0	kVAR
	109	VADemand	Apparent Power Demand	DINT	4	1000	0	2000000000	0	kVA
	110	MaxVADemand	Maximum Apparent Power Demand	DINT	4	1000	0	2000000000	0	kVA
Analog Monitoring	111	InAnMod1Ch00	Value measured at Analog Expansion Module 1 Input 00	UINT	2	1	0	65535	0	
	112	InAnMod1Ch01	Value measured at Analog Expansion Module 1 Input 01	UINT	2	1	0	65535	0	
	113	InAnMod1Ch02	Value measured at Analog Expansion Module 1 Input 02	UINT	2	1	0	65535	0	
	114	InAnMod2Ch00	Value measured at Analog Expansion Module 2 Input 00	UINT	2	1	0	65535	0	
	115	InAnMod2Ch01	Value measured at Analog Expansion Module 2 Input 01	UINT	2	1	0	65535	0	
	116	InAnMod2Ch02	Value measured at Analog Expansion Module 2 Input 02	UINT	2	1	0	65535	0	
	117	InAnMod3Ch00	Value measured at Analog Expansion Module 3 Input 00	UINT	2	1	0	65535	0	
	118	InAnMod3Ch01	Value measured at Analog Expansion Module 3 Input 01	UINT	2	1	0	65535	0	
	119	InAnMod3Ch02	Value measured at Analog Expansion Module 3 Input 02	UINT	2	1	0	65535	0	
	120	InAnMod4Ch00	Value measured at Analog Expansion Module 4 Input 00	UINT	2	1	0	65535	0	
	121	InAnMod4Ch01	Value measured at Analog Expansion Module 4 Input 01	UINT	2	1	0	65535	0	
	122	InAnMod4Ch02	Value measured at Analog Expansion Module 4 Input 02	UINT	2	1	0	65535	0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog Monitoring (Continued)	123	AnalogMod1Status	Analog Expansion Module 1 Status	UINT	2	1	Bit0= InCh00OpenCrcuit Bit1= InCh00OverRange Bit2= InCh00UnderRange Bit3= InCh01OpenCrcuit Bit4= InCh01OverRange Bit5= InCh01UnderRange Bit6= InCh02OpenCrcuit Bit7= InCh02OverRange Bit8= InCh02UnderRange Bit9= OutOpenCircuit Bit10= OutHoldLastSt Bit11= OutOverRange Bit12= OutUnderRange Bit 13=Module Configured Bit 14=Module Warning Bit 15=Module Faulted		0	
	124	AnalogMod2Status	Analog Expansion Module 2 Status	UINT	2	1	Bit0= InCh00OpenCrcuit Bit1= InCh00OverRange Bit2= InCh00UnderRange Bit3= InCh01OpenCrcuit Bit4= InCh01OverRange Bit5= InCh01UnderRange Bit6= InCh02OpenCrcuit Bit7= InCh02OverRange Bit8= InCh02UnderRange Bit9= OutOpenCircuit Bit10= OutHoldLastSt Bit11= OutOverRange Bit12= OutUnderRange Bit 13=Module Configured Bit 14=Module Warning Bit 15=Module Faulted		0	
	125	AnalogMod3Status	Analog Expansion Module 3 Status	UINT	2	1	Bit0= InCh00OpenCrcuit Bit1= InCh00OverRange Bit2= InCh00UnderRange Bit3= InCh01OpenCrcuit Bit4= InCh01OverRange Bit5= InCh01UnderRange Bit6= InCh02OpenCrcuit Bit7= InCh02OverRange Bit8= InCh02UnderRange Bit9= OutOpenCircuit Bit10= OutHoldLastSt Bit11= OutOverRange Bit12= OutUnderRange Bit 13=Module Configured Bit 14=Module Warning Bit 15=Module Faulted		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog Monitoring (Continued)	126	AnalogMod4Status	Analog Expansion Module 4 Status	UINT	2	1	Bit0= InCh00OpenCrcuit Bit1= InCh00OverRange Bit2= InCh00UnderRange Bit3= InCh01OpenCrcuit Bit4= InCh01OverRange Bit5= InCh01UnderRange Bit6= InCh02OpenCrcuit Bit7= InCh02OverRange Bit8= InCh02UnderRange Bit9= OutOpenCircuit Bit10= OutHoldLastSt Bit11= OutOverRange Bit12= OutUnderRange Bit 13=Module Configured Bit 14=Module Warning Bit 15=Module Faulted		0	
Trip/Warn History	127	TripHistory0	Last trip to occur	UINT	2	1	See Trip History Codes		0	
	128	TripHistory1	Second last trip to occur	UINT	2	1	See Trip History Codes		0	
	129	TripHistory2	Third last trip to occur	UINT	2	1	See Trip History Codes		0	
	130	TripHistory3	Fourth last trip to occur	UINT	2	1	See Trip History Codes		0	
	131	TripHistory4	Fifth last trip to occur	UINT	2	1	See Trip History Codes		0	
	132	Reserved								
	133	WarningHistory0	Last warning to occur.	UINT	2	1	See Warning History Codes		0	
	134	WarningHistory1	Second last warning to occur.	UINT	2	1	See Warning History Codes		0	
	135	WarningHistory2	Third last warning to occur.	UINT	2	1	See Warning History Codes		0	
	136	WarningHistory3	Fourth last warning to occur.	UINT	2	1	See Warning History Codes		0	
	137	WarningHistory4	Fifth last warning to occur.	UINT	2	1	See Warning History Codes		0	
	138	Reserved								
	139	TripHistoryMaskI	Trip History Mask for Current Based Trips	UINT	2	1	Bit0= OverloadTrip Bit1= PhaseLossTrip Bit2= GroundFaultTrip Bit3= StallTrip Bit4= JamTrip Bit5= UnderloadTrip Bit6= CurrentImbalTrip Bit7= L1UnderCurrTrip Bit8= L2UnderCurrTrip Bit9= L3UnderCurrTrip Bit10= L1OverCurrenTrip Bit11= L2OverCurrenTrip Bit12= L3OverCurrenTrip Bit13= L1LineLossTrip Bit14= L2LineLossTrip Bit15= L3LineLossTrip		0xFFFF	
	140	TripHistoryMaskV	Trip History Mask for Voltage Based Trips	UINT	2	1	Bit0= UnderVoltageTrip Bit1= OvervoltageTrip Bit2= VoltageUnbalTrip Bit3= PhaseRotationTrp Bit4= UnderFreqTrip Bit5= OverFreqTrip		0x3F	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Trip/Warn History (continued)	141	TripHistoryMaskP	Trip History Mask for Power Based Trips	UINT	2	1	Bit0= UnderKWTrip Bit1= OverKWTrip Bit2= UnderKVARConTrip Bit3= OverKVARConTrip Bit4= UnderKVARGenTrip Bit5= OverKVARGenTrip Bit6= UnderKVATrip Bit7= OverKVATrip Bit8= UnderPFLagTrip Bit9= OverPFLagTrip Bit10= UnderPFLeadTrip Bit11= OverPFLeadTrip		0xFFF	
	142	TripHistoryMaskC	Trip History Mask for Control Based Trips	UINT	2	1	Bit0= TestTrip Bit1= PTCTrip Bit2= DLXTrip Bit3= OperStationTrip Bit4= RemoteTrip Bit5= BlockedStartTrip Bit6= HardwareFltTrip Bit7= ConfigTrip Bit8= OptionMatchTrip Bit9= DLXFBTimeoutTrip Bit10= ExpansionBusTrip Bit11= Reserved Bit12= Reserved Bit13= NVSTrip Bit14=TestModeTrip		0x27FF	
	143	TripHistoryMaskA	Trip History Mask for Analog Input Based Trips	UINT	2	1	Bit0= InAnMod1Ch00Trip Bit1= InAnMod1Ch01Trip Bit2= InAnMod1Ch02Trip Bit3= InAnMod2Ch00Trip Bit4= InAnMod2Ch01Trip Bit5= InAnMod2Ch02Trip Bit6= InAnMod3Ch00Trip Bit7= InAnMod3Ch01Trip Bit8= InAnMod3Ch02Trip Bit9= InAnMod4Ch00Trip Bit10= InAnMod4Ch01Trip Bit11= InAnMod4Ch02Trip		0xFFF	
	144	Reserved								

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Trip/Warn History (continued)	145	WarnHistoryMaskI	Warning History Mask for Current Based Warnings	UINT	2	1	Bit0= OverloadWarning Bit1= Reserved Bit2= GroundFltWarning Bit3= Reserved Bit4= JamWarning Bit5= UnderloadWarning Bit6= CurrentImbalWarn Bit7= L1UnderCurrWarn Bit8= L2UnderCurrWarn Bit9= L3UnderCurrWarn Bit10= L1OverCurrenWarn Bit11= L2OverCurrenWarn Bit12= L3OverCurrenWarn Bit13= L1LineLossWarn Bit14= L2LineLossWarn Bit15= L3LineLossWarn		0xFFFF	
	146	WarnHistoryMaskV	Warning History Mask for Voltage Based Warnings	UINT	2	1	Bit0= UnderVoltageWarn Bit1= OvervoltageWarn Bit2= VoltageUnbalWarn Bit3= PhaseRotationWrn Bit4= UnderFreqWarning Bit5= OverFreqWarning		0x3F	
	147	WarnHistoryMaskP	Warning History Mask for Power Based Warnings	UINT	2	1	Bit0= UnderKWWarning Bit1= OverKWWarning Bit2= UnderKVARConWarn Bit3= OverKVARConWarn Bit4= UnderKVARGenWarn Bit5= OverKVARGenWarn Bit6= UnderKVAWarning Bit7= OverKVAWarning Bit8= UnderPFLagWarn Bit9= OverPFLagWarn Bit10= UnderPFLeadWarn Bit11= OverPFLeadWarn		0xFFF	
	148	WarnHistoryMaskC	Warning History Mask for Control Based Warnings	UINT	2	1	Bit0= Reserved Bit1= PTCWarning Bit2= DLXWarning Bit3= Reserved Bit4= Reserved Bit5= Reserved Bit6= Reserved Bit7= ConfigWarning Bit8= OptionMatchWarn Bit9= DLXFBTimeoutWarn Bit10= ExpansionBusWarn Bit11= PMNumberOfStarts Bit12= PMOperatingHours		0x1FFF	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Trip/Warn History (continued)	149	WarnHistoryMaskA	Warning History Mask for Analog Input Based Warnings	UINT	2	1	Bit0= InAnMod1Ch00Warn Bit1= InAnMod1Ch01Warn Bit2= InAnMod1Ch02Warn Bit3= InAnMod2Ch00Warn Bit4= InAnMod2Ch01Warn Bit5= InAnMod2Ch02Warn Bit6= InAnMod3Ch00Warn Bit7= InAnMod3Ch01Warn Bit8= InAnMod3Ch02Warn Bit9= InAnMod4Ch00Warn Bit10= InAnMod4Ch01Warn Bit11= InAnMod4Ch02Warn		0xFFF	
	150	Reserved								
Trip Snapshot	151	TSL1Current	Snapshot of the actual L1 Phase Current at trip	DINT	4	100	0	2000000000	0	Amps
	152	TSL2Current	Snapshot of the actual L2 Phase Current at trip	DINT	4	100	0	2000000000	0	Amps
	153	TSL3Current	Snapshot of the actual L3 Phase Current at trip	DINT	4	100	0	2000000000	0	Amps
	154	TSThermUtilized	Snapshot of % Thermal Capacity Used at trip	UINT	2	1	0	100	0	%
	155	TSGFCurrent	Snapshot of the Ground Fault Current at trip	INT	2	100	0	2540	0	Amps
	156	TSL1toL2Voltage	Snapshot of 3 Phase RMS Voltage Line-Line at trip	UINT	2	10	0	65535	0	Volt
	157	TSL2toL3Voltage	Snapshot of 3 Phase RMS Voltage Line-Line at trip	UINT	2	10	0	65535	0	Volt
	158	TSL3toL1Voltage	Snapshot of 3 Phase RMS Voltage Line-Line at trip	UINT	2	10	0	65535	0	Volt
	159	TSTotalRealPwr	Snapshot of Total Real Power at trip	DINT	4	1000	-2000000000	2000000000	0	kW
	160	TSTotalkVAR	Snapshot of Total Reactive Power at trip	DINT	4	1000	-2000000000	2000000000	0	kVAR
	161	TSTotalkVA	Snapshot of Total Apparent Power at trip	DINT	4	1000	0	2000000000	0	kVA
	162	TSTotalPF	Snapshot of Total True Power Factor (PF) at trip	INT	2	10	-1000	1000	0	%
Command	163	TripReset	Attempt to reset a trip	BOOL	0=Ready 1=TripReset		0	1	0	
	164	ConfigPreset	IO Configuration based on Logic Personality	USINT	0=Ready 1=Factory Defaults		0	54	0	
	165	ClearCommand	Reset Accumulator(s)	USINT	1	1	0= Ready 1= ClrOperStats 2= ClrHistoryLogs 3= ClrPercentTCU 4= ClrKWh 5= ClrKVARh 6= ClrKVAh 7= ClrMaxKWDemad 8= ClrMaxKVARDemand 9= ClrMaxKVADemand 10= ClearAll		0	
	166	Reserved								
	167	Reserved								
	168	Reserved								

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Command (Continued)	169	Reserved								
	170	Reserved								
Overload Setup	171	FLASetting	Overload Full Load Current Setting	UDINT	4	100	50	6553500	50	Amps
	172	TripClass	Trip Class Setting	USINT	1	1	5	30	10	
	173	OLPTCResetMode	Overload and PTC Trip Reset Mode	BOOL	1	1	0=Manual 1=Automatic		0	
	174	OLResetLevel	Overload Trip Reset Level	USINT	1	1	0	100	75	%TCU
	175	OLWarningLevel	Overload Warning Reset Level	USINT	1	1	0	100	85	%TCU
	176	SingleOrThree Ph	Single Phase = L1 & L2	BOOL	1	1	0=SinglePhase 1=ThreePhase		1	
	177	FLA2Setting	Overload Full Load Current Setting 2	UDINT	4	100	50	6553500	50	Amps
	178	Reserved								
	179	Reserved								
	180	Reserved								
	181	Reserved								
	182	Reserved								
Device Setup	183	TripEnableI	Bitmask used to enable/disable current based trips	UINT	2	1	Bit0= OverloadTrip Bit1= PhaseLossTrip Bit2= GroundFaultTrip Bit3= StallTrip Bit4= JamTrip Bit5= UnderloadTrip Bit6= CurrentImbalTrip Bit7= L1UnderCurrTrip Bit8= L2UnderCurrTrip Bit9= L3UnderCurrTrip Bit10= L1OverCurrenTrip Bit11= L2OverCurrenTrip Bit12= L3OverCurrenTrip Bit13= L1LineLossTrip Bit14= L2LineLossTrip Bit15= L3LineLossTrip		3	
	184	TripEnableV	Bitmask used to enable/disable voltage based trips	UINT	2	1	Bit0= UnderVoltageTrip Bit1= OvervoltageTrip Bit2= VoltageUnbalTrip Bit3= PhaseRotationTrp Bit4= UnderFreqTrip Bit5= OverFreqTrip		0	
	185	TripEnableP	Bitmask used to enable/disable power based trips	UINT	2	1	Bit0= UnderKWTrip Bit1= OverKWTrip Bit2= UnderKVARConTrip Bit3= OverKVARConTrip Bit4= UnderKVARGenTrip Bit5= OverKVARGenTrip Bit6= UnderKVATrip Bit7= OverKVATrip Bit8= UnderPFLagTrip Bit9= OverPFLagTrip Bit10= UnderPFLeadTrip Bit11= OverPFLeadTrip		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Setup (continued)	186	TripEnableC	Bitmask used to enable/disable control based trips	UINT	2	1	Bit0= TestTrip Bit1= PTCTrip Bit2= DLXTrip Bit3= OperStationTrip Bit4= RemoteTrip Bit5= BlockedStartTrip Bit6= HardwareFltTrip Bit7= ConfigTrip Bit8= OptionMatchTrip Bit9= DLXFBTimeoutTrip Bit10= ExpansionBusTrip Bit11= Reserved Bit12= Reserved Bit13= NVSTrip Bit14=TestModeTrip		1	
	187	TripEnableA	Bitmask used to enable/disable analog based trips	UINT	2	1	Bit0= InAnMod1Ch00Trip Bit1= InAnMod1Ch01Trip Bit2= InAnMod1Ch02Trip Bit3= InAnMod2Ch00Trip Bit4= InAnMod2Ch01Trip Bit5= InAnMod2Ch02Trip Bit6= InAnMod3Ch00Trip Bit7= InAnMod3Ch01Trip Bit8= InAnMod3Ch02Trip Bit9= InAnMod4Ch00Trip Bit10= InAnMod4Ch01Trip Bit11= InAnMod4Ch02Trip		0	
	188	Reserved								
	189	WarningEnableI	Bitmask used to enable/disable current based warnings	UINT	2	1	Bit0= OverloadWarning Bit1= Reserved Bit2= GroundFltWarning Bit3= Reserved Bit4= JamWarning Bit5= UnderloadWarning Bit6= CurrentImbalWarn Bit7= L1UnderCurrWarn Bit8= L2UnderCurrWarn Bit9= L3UnderCurrWarn Bit10= L1OverCurrenWarn Bit11= L2OverCurrenWarn Bit12= L3OverCurrenWarn Bit13= L1LineLossWarn Bit14= L2LineLossWarn Bit15= L3LineLossWarn		0	
	190	WarningEnableV	Bitmask used to enable/disable voltage based warnings	UINT	2	1	Bit0= UnderVoltageWarn Bit1= OvervoltageWarn Bit2= VoltageUnbalWarn Bit3= PhaseRotationWrn Bit4= UnderFreqWarning Bit5= OverFreqWarning		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Setup (continued)	191	WarningEnableP	Bitmask used to enable/disable power based warnings	UINT	2	1	Bit0= UnderKWWarning Bit1= OverKWWarning Bit2= UnderKVARConWarn Bit3= OverKVARConWarn Bit4= UnderKVARGenWarn Bit5= OverKVARGenWarn Bit6= UnderKVAWarning Bit7= OverKVAWarning Bit8= UnderPFLagWarn Bit9= OverPFLagWarn Bit10= UnderPFLeadWarn Bit11= OverPFLeadWarn		0	
	192	WarningEnableC	Bitmask used to enable/disable control based warnings	UINT	2	1	Bit0= Reserved Bit1= PTCWarning Bit2= DLXWarning Bit3= Reserved Bit4= Reserved Bit5= Reserved Bit6= Reserved Bit7= ConfigWarning Bit8= OptionMatchWarn Bit9= DLXFBTimeoutWarn Bit10= ExpansionBusWarn Bit11= PMNumberOfStarts Bit12= PMOperatingHour		0	
	CEP9	WarningEnableA	Bitmask used to enable/disable analog based warnings	UINT	2	1	Bit0= InAnMod1Ch00Warn Bit1= InAnMod1Ch01Warn Bit2= InAnMod1Ch02Warn Bit3= InAnMod2Ch00Warn Bit4= InAnMod2Ch01Warn Bit5= InAnMod2Ch02Warn Bit6= InAnMod3Ch00Warn Bit7= InAnMod3Ch01Warn Bit8= InAnMod3Ch02Warn Bit9= InAnMod4Ch00Warn Bit10= InAnMod4Ch01Warn Bit11= InAnMod4Ch02Warn		0	
	194	Reserved								
	195	SetOperatingMode	Logic personality Selection	USINT	1	1	2	54	2	
	196	InPt00Assignment	Assignment for Input Point 00 function	USINT	1	1	0=Normal 1=TripReset 2=RemoteTrip 3=ActivateFLA2 4=ForceSnapshot 5=EmergencyStart 6=TestMode 7=L1LossArm 8=L2LossArm 9=L3LossArm 10=L1L2LossArm 11=L2L3LossArm 12=L1L3LossArm 13=L1L2L3LossArm		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Setup (continued	197	InPt01Assignment	Assignment for Input Point 01 function	USINT	1	1	0=Normal 1=TripReset 2=RemoteTrip 3=ActivateFLA2 4=ForceSnapshot 5=EmergencyStart 6=TestMode 7=L1LossArm 8=L2LossArm 9=L3LossArm 10=L1L2LossArm 11=L2L3LossArm 12=L1L3LossArm 13=L1L2L3LossArm		0	
	198	InPt02Assignment	Assignment for Input Point 02 function	USINT	1	1	0=Normal 1=TripReset 2=RemoteTrip 3=ActivateFLA2 4=ForceSnapshot 5=EmergencyStart 6=TestMode 7=L1LossArm 8=L2LossArm 9=L3LossArm 10=L1L2LossArm 11=L2L3LossArm 12=L1L3LossArm 13=L1L2L3LossArm		0	
	199	InPt03Assignment	Assignment for Input Point 03 function	USINT	1	1	0=Normal 1=TripReset 2=RemoteTrip 3=ActivateFLA2 4=ForceSnapshot 5=EmergencyStart 6=TestMode 7=L1LossArm 8=L2LossArm 9=L3LossArm 10=L1L2LossArm 11=L2L3LossArm 12=L1L3LossArm 13=L1L2L3LossArm		0	
	200	InPt04Assignment	Assignment for Input Point 04 function	USINT	1	1	0=Normal 1=TripReset 2=RemoteTrip 3=ActivateFLA2 4=ForceSnapshot 5=EmergencyStart 6=TestMode 7=L1LossArm 8=L2LossArm 9=L3LossArm 10=L1L2LossArm 11=L2L3LossArm 12=L1L3LossArm 13=L1L2L3LossArm		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Setup (continued	201	InPt05Assignment	Assignment for Input Point 05 function	USINT	1	1	0=Normal 1=TripReset 2=RemoteTrip 3=ActivateFLA2 4=ForceSnapshot 5=EmergencyStart 6=TestMode 7=L1LossArm 8=L2LossArm 9=L3LossArm 10=L1L2LossArm 11=L2L3LossArm 12=L1L3LossArm 13=L1L2L3LossArm		0	
	202	OutPt0Assignment	Assignment for OutputPt00 function	USINT	1	1	0=Normal 1=TripRelay 2=ControlRelay 3=TripAlarm 4=WarningAlarm 5=MonL1TripRelay 6= MonL2TripRelay 7= MonL3TripRelay		1	
	203	OutPt1Assignment	Assignment for OutputPt01 function	USINT	1	1	0=Normal 1=TripRelay 2=ControlRelay 3=TripAlarm 4=WarningAlarm 5=MonL1TripRelay 6= MonL2TripRelay 7= MonL3TripRelay		0	
	204	OutPt2Assignment	Assignment for OutputPt02 function	USINT	1	1	0=Normal 1=TripRelay 2=ControlRelay 3=TripAlarm 4=WarningAlarm 5=MonL1TripRelay 6= MonL2TripRelay 7= MonL3TripRelay		0	
	205	StartsPerHour	Allowable Starts per Hour	USINT	1	1	0	120	2	
	206	StartsInterval	The minimum allowable interval between starts	UINT	2	1	0	3600	600	Sec
	207	PMTotalStarts	Total number of starts for preventative maintenance	UINT	2	1	0	65535	0	
	208	PMOperatingHours	Total operating hours for preventative maintenance	UINT	2	1	0	65535	0	Hrs
	209	ActFLA2wOutput	Select FLA2 activate source	USINT	1	1	0=Disable 1=OutputPt00 2=OutputPt01 3=OutputPt02		0	
	210	Reserved								

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Device Setup (continued	211	SecurityPolicy	Select network security feature locks	UINT	2	1	Bit0= DeviceConfigEna Bit1= DeviceResetEna Bit2= FWUpdateEnable Bit3= NetworkCfgEna Bit4= PortCfgEna Bit5= Reserved Bit6= Reserved Bit7= Reserved Bit8= Reserved Bit9= Reserved Bit10= Reserved Bit11= Reserved Bit12= Reserved Bit13= Reserved Bit14= Reserved Bit15= PolicyConfigEna		0x8007	
	212	Language	Select the language	USINT	1	1	0	2	0	
	213	FeedbackTimeout	DeviceLogix Feedback Timer Timeout	UINT	2	1	0	65535	500	
	214	TransitionDelay	Motor Contactor Transition Delay	UINT	2	1	0	65535	10000	
	215	InterlockDelay	Motor Contactor Interlock Delay	UINT	2	1	1	65535	100	
	216	EmergencyStartEn	Enables the ability to command an Emergency Start of the motor	UINT	1	1	0=Disable 1=Enable		0	
	217	Reserved								
	218	Reserved								
	219	Reserved								
	220	Reserved								
Options Setup	221	ControlModuleTyp	Select Control Module Type	USINT	1	1	0= IgnoreType 1= 6In3Out24VDC 2= 4In3Out120VAC 3= 4In3Out240VAC 4= 4In2OutGFPTC24V 5= 2In2OutGFPTC120V 6= 2In2OutGFPTC240V		0	
	222	SensingModuleTyp	Select Sensing Module Type	USINT	1	1	0= IgnoreType 1= VIGPt5to30Amp 2= VIG6to60Amp 3= VIG10to100Amp 4= VIG20to200Amp 5= IGPt5to30Amp 6= IG6to60Amp 7= IG10to100Amp 8= IG20to200Amp 9= IPt5to30Amp 10= I6to60Amp 11= I10to100Amp 12= I20to200Amp		0	
	223	CommsModuleType	Select Communications Module Type	USINT	1	1	0=IgnoreType 1=EtherNetIP 2=DeviceNet 3=Profibus		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Options Setup (Continued)	224	OperStationType	Select Operator Station Type	USINT	1	1	0= IgnoreType 1= NoStation 2= ControlStation 3= DiagStation		0	
	225	DigitalMod1Type	Select Digital I/O Expansion Module 1 Type	USINT	1	1	0= IgnoreType 1=NoModule 2=4In2Out24VDC 3=4In2Out120VAC 4=4In2Out240VAC		0	
	226	DigitalMod2Type	Select Digital I/O Expansion Module 2 Type	USINT	1	1	0= IgnoreType 1=NoModule 2=4In2Out24VDC 3=4In2Out120VAC 4=4In2Out240VAC		0	
	227	DigitalMod3Type	Select Digital I/O Expansion Module 3 Type	USINT	1	1	0= IgnoreType 1=NoModule 2=4In2Out24VDC 3=4In2Out120VAC 4=4In2Out240VAC		0	
	228	DigitalMod4Type	Select Digital I/O Expansion Module 4 Type	USINT	1	1	0= IgnoreType 1=NoModule 2=4In2Out24VDC 3=4In2Out120VAC 4=4In2Out240VAC		0	
	229	AnalogMod1Type	Select Analog I/O Expansion Module 1 Type	USINT	1	1	0=IgnoreType 1=NoModule 2=3In1OutAnalog		0	
	230	AnalogMod2Type	Select Analog I/O Expansion Module 2 Type	USINT	1	1	0=IgnoreType 1=NoModule 2=3In1OutAnalog		0	
	231	AnalogMod3Type	Select Analog I/O Expansion Module 3 Type	USINT	1	1	0=IgnoreType 1=NoModule 2=3In1OutAnalog		0	
	232	AnalogMod4Type	Select Analog I/O Expansion Module 4 Type	USINT	1	1	0=IgnoreType 1=NoModule 2=3In1OutAnalog		0	
	233	MismatchAction	Select Mismatched Module Actions 0=warning 1= fault	UINT	1	1	Bit0= ControlModule Bit1= SensingModule Bit2= CommsModule Bit3= OperatorStation Bit4= DigitalModule1 Bit5= DigitalModule2 Bit6= DigitalModule3 Bit7= DigitalModule4 Bit8= AnalogModule1 Bit9= AnalogModule1 Bit10= AnalogModule1 Bit11= AnalogModule1		0	
	234	Reserved								
	235	Reserved								
	236	Reserved								
	237	Reserved								
	238	Reserved								

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Current Setup	239	PLInhibitTime	Phase Loss Inhibit Time	USINT	1	1	0	250	0	Sec
	240	PLTripDelay	Phase Loss Trip Delay	USINT	1	10	1	250	10	Sec
	241	GroundFaultType	Select Ground Fault Type	USINT	1	1	0= Disabled 1= Internal1to5Amps 2= ExtPt02toPt1Amps 3= ExtPt1toPt5Amps 4= ExtPt5to1Amps 5= External1to5Amps		0	
	242	GFInhibitTime	Ground Fault Inhibit Time	USINT	1	1	0	250	10	Sec
	243	GFTripDelay	Ground Fault Trip Delay	USINT	1	10	0	250	5	Sec
	244	GFTripLevel	Ground Fault Trip Level	UINT	2	100	2	500	200	Amps
	245	GFWarningDelay	Ground Fault Warning Delay	USINT	1	10	0	250	0	Sec
	246	GFWarningLevel	Ground Fault Warning Level	UINT	2	100	2	500	200	Amps
	247	GFFilter	Filter GF current from %TCU calculation	BOOL	1	1	0=Disable 1=Enable		0	
	248	GFMaxInhibit	Trip is inhibited when GF exceeds max value	BOOL	1	1	0=Disable 1=Enable		0	
	249	StallEnabledTime	Stall Monitor and Trip Delay	USINT	1	1	0	250	10	Sec
	250	StallTripLevel	Stall Trip Level	UINT	2	10	100	600	600	%FLA
	251	JamInhibitTime	Jam Detect Inhibit Time	USINT	1	1	0	250	10	Sec
	252	JamTripDelay	Jam Detect Trip Delay	USINT	1	10	1	250	50	Sec
	253	JamTripLevel	Jam Detect Trip Level	UINT	2	1	50	600	250	%FLA
	254	JamWarningLevel	Jam Detect Warning Level	UINT	2	1	50	600	150	%FLA
	255	ULInhibitTime	Underload Inhibit Time	USINT	1	1	0	250	10	Sec
	256	ULTripDelay	Underload Trip Delay	USINT	1	10	1	250	50	Sec
	257	ULTripLevel	Underload Trip Level	USINT	1	1	10	100	50	%FLA
	258	ULWarningLevel	Underload Warning Level	USINT	1	1	10	100	70	%FLA
	259	CIInhibitTime	Current Imbalance Inhibit Time	USINT	1	1	0	250	10	Sec
	260	CITripDelay	Current Imbalance Trip Delay	USINT	1	10	1	250	50	Sec
	261	CITripLevel	Current Imbalance Trip Level	USINT	1	1	10	100	35	%
	262	CIWarningLevel	Current Imbalance Warning Level	USINT	1	1	10	100	20	%
	263	CTPrimary	Current Transformer Primary Ratio	UINT	2	1	1	65535	5	
	264	CTSecondary	Current Transformer Secondary Ratio	UINT	2	1	1	65535	5	
	265	UCInhibit Time	Under Current Inhibit Time	USINT	1	1	0	250	10	Sec
	266	L1UCTripDelay	L1 Under Current Trip Delay	USINT	1	10	0	250	10	Sec
	267	L1UCTripLevel	L1 Under Current Trip Level	USINT	1	1	10	100	35	%
	268	L1UCWarningLevel	L1 Under Current Warning Level	USINT	1	1	10	100	40	%
	269	L2UCTripDelay	L2 Under Current Trip Delay	USINT	1	10	0	250	10	Sec
	270	L2UCTripLevel	L2 Under Current Trip Level	USINT	1	1	10	100	35	%
	271	L2UCWarningLevel	L2 Under Current Warning Level	USINT	1	1	10	100	40	%
	272	L3UCTripDelay	L3 Under Current Trip Delay	USINT	1	10	0	250	10	Sec
	273	L3UCTripLevel	L3 Under Current Trip Level	USINT	1	1	10	100	35	%
	274	L3UCWarningLevel	L3 Under Current Warning Level	USINT	1	1	10	100	40	%
	275	OCInhibitTime	Over Current Inhibit Time	USINT	1	1	0	250	10	Sec
	276	L1OCTripDelay	L1 Over Current Trip Delay	USINT	1	10	0	250	10	Sec
	277	L1OCTripLevel	L1 Over Current Trip Level	USINT	1	1	10	200	100	%
	278	L1OCWarningLevel	L1 Over Current Warning Level	USINT	1	1	10	200	90	%

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Current Setup continued	279	L2OCTripDelay	L2 Over Current Trip Delay	USINT	1	10	0	250	10	Sec
	280	L2OCTripLevel	L2 Over Current Trip Level	USINT	1	1	10	200	100	%
	281	L2OCWarningLevel	L2 Over Current Warning Level	USINT	1	1	10	200	90	%
	282	L3OCTripDelay	L3 Over Current Trip Delay	USINT	1	10	0	250	10	Sec
	283	L3OCTripLevel	L3 Over Current Trip Level	USINT	1	1	10	200	100	%
	284	L3OCWarningLevel	L3 Over Current Warning Level	USINT	1	1	10	200	90	%
	285	LineLossInhTime	Line Loss Inhibit Time	USINT	1	1	0	250	10	Sec
	286	L1LossTripDelay	L1 Line Loss Trip Delay	USINT	1	10	0	250	10	Sec
	287	L2LossTripDelay	L2 Line Loss Trip Delay	USINT	1	10	0	250	10	Sec
	288	L3LossTripDelay	L3 Line Loss Trip Delay	USINT	1	10	0	250	10	Sec
Communications Setup	289	OutputAssembly	Output Assembly Instance used by IO Connections	UINT	2	1	0	180	144	
	290	InputAssembly	Input Assembly Instance used by IO Connections	UINT	2	1	0	300	300	
	291	Datalink0	Produced I/O Assembly Datalink0 Parameter Number	UINT	2	1	0	560	0	
	292	Datalink1	Produced I/O Assembly Datalink1 Parameter Number	UINT	2	1	0	560	0	
	293	Datalink2	Produced I/O Assembly Datalink2 Parameter Number	UINT	2	1	0	560	0	
	294	Datalink3	Produced I/O Assembly Datalink3 Parameter Number	UINT	2	1	0	560	0	
	295	Datalink4	Produced I/O Assembly Datalink4 Parameter Number	UINT	2	1	0	560	0	
	296	Datalink5	Produced I/O Assembly Datalink5 Parameter Number	UINT	2	1	0	560	0	
	297	Datalink6	Produced I/O Assembly Datalink6 Parameter Number	UINT	2	1	0	560	0	
	298	Datalink7	Produced I/O Assembly Datalink7 Parameter Number	UINT	2	1	0	560	0	
	299	Reserved								
	300	Reserved								
	301	Reserved								
	302	Reserved								
	303	Reserved								
Output Setup	304	OutPt00PrFltAct	Output Pt00 action on protection fault	BOOL	1	1	0= GoToPrFltValue 1= IgnoreIfPossible		0	
	305	OutPt00PrFltVal	Output Pt00 value on protection fault	BOOL	1	1	0=Open 1=Closed		0	
	306	OutPt00ComFltAct	Output Pt00 action on comms fault	BOOL	1	1	0= GoToCommFltValue 1= HoldLastState		0	
	307	OutPt00ComFltVal	Out Pt00 value on comms fault	BOOL	1	1	0=Open 1=Closed		0	
	308	OutPt00ComIdlAct	Output Pt00 action on comms idle	BOOL	1	1	0= GoToCommIdlValue 1= HoldLastState		0	
	309	OutPt00ComIdlVal	Output Pt00 value on comms idle	BOOL	1	1	0=Open 1=Closed		0	
	310	OutPt01PrFltAct	Output Pt01 action on protection fault	BOOL	1	1	0= GoToPrFltValue 1= IgnoreIfPossible		0	
	311	OutPt01PrFltVal	Output Pt01 value on protection fault	BOOL	1	1	0=Open 1=Closed		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Output Setup Continued	312	OutPt01ComFltAct	Output Pt01 action on comms fault	BOOL	1	1	0= GoToCommFltValue 1= HoldLastState		0	
	313	OutPt01ComFltVal	Output Pt01 value on comms fault	BOOL	1	1	0=Open 1=Closed		0	
	314	OutPt01ComIdlAct	Output Pt01 action on comms idle	BOOL	1	1	0= GoToCommIdlValue 1= HoldLastState		0	
	315	OutPt01ComIdlVal	Output Pt01 value on comms idle	BOOL	1	1	0=Open 1=Closed		0	
	316	OutPt02PrFltAct	Output Pt02 action on protection fault	BOOL	1	1	0= GoToPrFltValue 1= IgnoreIfPossible		0	
	317	OutPt02PrFltVal	Output Pt02 value on protection fault	BOOL	1	1	0=Open 1=Closed		0	
	318	OutPt02ComFltAct	Output Pt02 action on comms fault	BOOL	1	1	0= GoToCommFltValue 1= HoldLastState		0	
	319	OutPt02ComFltVal	Output Pt02 value on comms fault	BOOL	1	1	0=Open 1=Closed		0	
	320	OutPt02ComIdlAct	Output Pt02 action on comms idle	BOOL	1	1	0= GoToCommIdlValue 1= HoldLastState		0	
	321	OutPt02ComIdlVal	Output Pt02 value on comms idle	BOOL	1	1	0=Open 1=Closed		0	
	322	OutDig1PrFltAct	Digital Expansion Module 1 Outputs action on protection fault	BOOL	1	1	0= GoToPrFltValue 1= Ignore		0	
	323	OutDig1PrFltVal	Digital Expansion Module 1 Outputs value on protection fault	BOOL	1	1	0=Open 1=Closed		0	
	324	OutDig1ComFltAct	Digital Expansion Module 1 Outputs action on comms fault	BOOL	1	1	0= GoToCommFltValue 1= HoldLastState		0	
	325	OutDig1ComFltVal	Digital Expansion Module 1 Outputs value on comms fault	BOOL	1	1	0=Open 1=Closed		0	
	326	OutDig1ComIdlAct	Digital Expansion Module 1 Outputs action on comms idle	BOOL	1	1	0= GoToCommIdlValue 1= HoldLastState		0	
	327	OutDig1ComIdlVal	Digital Expansion Module 1 Outputs value on comms idle	BOOL	1	1	0=Open 1=Closed		0	
	328	OutDig2PrFltAct	Digital Expansion Module 2 Outputs action on protection fault	BOOL	1	1	0= GoToPrFltValue 1= Ignore		0	
	329	OutDig2PrFltVal	Digital Expansion Module 2 Outputs value on protection fault	BOOL	1	1	0=Open 1=Closed		0	
	330	OutDig2ComFltAct	Digital Expansion Module 2 Outputs action on comms fault	BOOL	1	1	0= GoToCommFltValue 1= HoldLastState		0	
	331	OutDig2ComFltVal	Digital Expansion Module 2 Outputs value on comms fault	BOOL	1	1	0=Open 1=Closed		0	
	332	OutDig2ComIdlAct	Digital Expansion Module 2 Outputs action on comms idle	BOOL	1	1	0= GoToCommIdlValue 1= HoldLastState		0	
	333	OutDig2ComIdlVal	Digital Expansion Module 2 Outputs value on comms idle	BOOL	1	1	0=Open 1=Closed		0	
	334	OutDig3PrFltAct	Digital Expansion Module 3 Outputs action on protection fault	BOOL	1	1	0= GoToPrFltValue 1= Ignore		0	
	335	OutDig3PrFltVal	Digital Expansion Module 3 Outputs value on protection fault	BOOL	1	1	0=Open 1=Closed		0	
	336	OutDig3ComFltAct	Digital Expansion Module 3 Outputs action on comms fault	BOOL	1	1	0= GoToCommFltValue 1= HoldLastState		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Output Setup (Continued)	337	OutDig3ComFltVal	Digital Expansion Module 3 Outputs value on comms fault	BOOL	1	1	0=Open 1=Closed		0	
	338	OuDig3ComIdlAct	Digital Expansion Module 3 Outputs action on comms idle	BOOL	1	1	0= GoToCommIdlValue 1= HoldLastState		0	
	339	OutDig3ComIdlVal	Digital Expansion Module 3 Outputs value on comms idle	BOOL	1	1	0=Open 1=Closed		0	
	340	OutDig4PrFltAct	Digital Expansion Module 4 Outputs action on protection fault	BOOL	1	1	0= GoToPrFltValue 1= Ignore		0	
	341	OutDig4PrFltVal	Digital Expansion Module 4 Outputs value on protection fault	BOOL	1	1	0=Open 1=Closed		0	
	342	OutDig4ComFltAct	Digital Expansion Module 4 Outputs action on comms fault	BOOL	1	1	0= GoToCommFltValue 1= HoldLastState		0	
	343	OutDig4ComFltVal	Digital Expansion Module 4 Outputs value on comms fault	BOOL	1	1	0=Open 1=Closed		0	
	344	OutDig4ComIdlAct	Digital Expansion Module 4 Outputs action on comms idle	BOOL	1	1	0= GoToCommIdlValue 1= HoldLastState		0	
	345	OutDig4ComIdlVal	Digital Expansion Module 4 Outputs value on comms idle	BOOL	1	1	0=Open 1=Closed		0	
DeviceLogix Setup	346	CommOverride	Enabling allows local logic to override a loss of an I/O Connection.	BOOL	1	1	0=Disable 1=Enable		0	
	347	NetworkOverride	Enabling allows local logic to override a Network Fault.	BOOL	1	1	0=Disable 1=Enable		0	
	348	PtDeviceOuts	Status of DeviceLogix Network Outputs.	UINT	2	1	Bit0= Pt00DeviceOut Bit1= Pt01DeviceOut Bit2= Pt02DeviceOut Bit3= Pt03DeviceOut Bit4= Pt04DeviceOut Bit5= Pt05DeviceOut Bit6= Pt06DeviceOut Bit7= Pt07DeviceOut Bit8= Pt08DeviceOut Bit9= Pt09DeviceOut Bit10= Pt10DeviceOut Bit11= Pt11DeviceOut Bit12= Pt12DeviceOut Bit13= Pt13DeviceOut Bit14= Pt14DeviceOut Bit15= Pt15DeviceOut		0	
	349	Reserved								

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
DeviceLogix Setup (Continued)	350	PtDevOutCOSMask	When bit is set the network output will trigger a COS message.	UINT	2	1	Bit0= Pt00DeviceOut Bit1= Pt01DeviceOut Bit2= Pt02DeviceOut Bit3= Pt03DeviceOut Bit4= Pt04DeviceOut Bit5= Pt05DeviceOut Bit6= Pt06DeviceOut Bit7= Pt07DeviceOut Bit8= Pt08DeviceOut Bit9= Pt09DeviceOut Bit10= Pt10DeviceOut Bit11= Pt11DeviceOut Bit12= Pt12DeviceOut Bit13= Pt13DeviceOut Bit14= Pt14DeviceOut Bit15= Pt15DeviceOut		0	
	351	DLXUserDefData	General Purpose Data Value for Use in DeviceLogix Programs	UDINT	4	1	0	0xFFFFFFFF	0	
Voltage Setup	352	VoltageMode	Voltage Wiring Mode	USINT	1	1	0= Delta 1= Wye 2= DeltaPTDelta2Wye 3= WyePTDelta2Wye 4= DeltaPTWye2Delta 5= WyePTWye2Delta		0	
	353	PTPrimary	Potential Transformer Primary Rating	UINT	2	1	1	65535	480	
	354	PTSecondary	Potential Transformer Secondary Rating	UINT	2	1	1	540	480	
	355	UVInhibitTime	Under Voltage Inhibit Time	USINT	1	1	0	250	10	Sec
	356	UVTripDelay	Under Voltage Trip Delay	USINT	1	10	1	250	10	Sec
	357	UVTripLevel	Under Voltage Trip Level	UINT	2	10	0	65535	1000	Volt
	358	UVWarningLevel	Under Voltage Warning Level	UINT	2	10	0	65535	4000	Volt
	359	OVInhibitTime	Over Voltage Inhibit Time	USINT	1	1	0	250	10	Sec
	360	OVTripDelay	Over Voltage Trip Delay	USINT	1	10	1	250	10	Sec
	361	OVTripLevel	Over Voltage Trip Level	UINT	2	10	0	65535	5000	Volt
	362	OVWarningLevel	Over Voltage Warning Level	UINT	2	10	0	65535	4900	Volt
	363	PhRotInhibitTime	Phase Rotation Inhibit Time	USINT	1	1	0	250	10	Sec
	364	PhaseRotTripType	Voltage Phase Rotation Trip Type	USINT	1	1	1	2	1	
	365	VUBInhibitTime	Voltage Unbalance Inhibit Time	USINT	1	1	0	250	10	Sec
	366	VUBTripDelay	Voltage Unbalance Trip Delay	USINT	1	10	1	250	10	Sec
	367	VUBTripLevel	Voltage Unbalance Trip Level	USINT	1	1	0	100	85	%
	368	VUBWarningLevel	Voltage Unbalance Warning Level	USINT	1	1	0	100	75	%
	369	UFInhibitTime	Under Frequency Inhibit Time	USINT	1	1	0	250	10	Sec
	370	UFTripDelay	Under Frequency Trip Delay	USINT	1	10	1	250	10	Sec
	371	UFTripLevel	Under Frequency Trip Level	USINT	1	1	46	65	57	Hz
	372	UFWarningLevel	Under Frequency Warning Level	USINT	1	1	46	65	58	Hz
	373	OFInhibitTime	Over Frequency Inhibit Time	USINT	1	1	0	250	10	Sec
	374	OFTripDelay	Over Frequency Trip Delay	USINT	1	10	1	250	10	Sec
	375	OFTripLevel	Over Frequency Trip Level	USINT	1	1	46	65	63	Hz
	376	OFWarningLevel	Over Frequency Warning Level	USINT	1	1	46	65	62	Hz
Power Setup	377	PowerScale	Power value scale factor (kW MW)	USINT	1	1	0=kW 1=MW		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Power Setup (Continued)	378	UWInhibitTime	Under Total Real Power Inhibit Time	USINT	1	1	0	250	10	Sec
	379	UWTripDelay	Under Total Real Power Trip Delay	USINT	1	10	1	250	10	Sec
	380	UWTripLevel	Under Total Real Power Trip Level	DINT	4	1000	0	2000000000	0	kW
	381	UWWarningLevel	Under Total Real Power Warning Level	DINT	4	1000	0	2000000000	0	kW
	382	OWInhibitTime	Over Total Real Power Inhibit Time	USINT	1	1	0	250	10	Sec
	383	OWTripDelay	Over Total Real Power Trip Delay	USINT	1	10	1	250	10	Sec
	384	OWTripLevel	Over Total Real Power Trip Level	DINT	4	1000	0	2000000000	0	kW
	385	OWWarningLevel	Over Total Real Power Warning Level	DINT	4	1000	0	2000000000	0	kW
	386	UVARCInhibitTime	Under Total Reactive Power Consumed (+kVAR) Inhibit Time	USINT	1	1	0	250	10	Sec
	387	UVARCTripDelay	Under Total Reactive Power Consumed (+kVAR) Trip Delay	USINT	1	10	1	250	10	Sec
	388	UVARCTripLevel	Under Total Reactive Power Consumed (+kVAR) Trip Level	DINT	4	1000	0	2000000000	0	kVAR
	389	UVARCWarnLevel	Under Total Reactive Power Consumed (+kVAR) Warning Level	DINT	4	1000	0	2000000000	0	kVAR
	390	OVARCInhibitTime	Over Total Reactive Power Consumed (+kVAR) Inhibit Time	USINT	1	1	0	250	10	Sec
	391	OVARCTripDelay	Over Total Reactive Power Consumed (+kVAR) Trip Delay	USINT	1	10	1	250	10	Sec
	392	OVARCTripLevel	Over Total Reactive Power Consumed (+kVAR) Trip Level	DINT	4	1000	0	2000000000	0	kVAR
	393	OVARCWarnLevel	Over Total Reactive Power Consumed (+kVAR) Warning Level	DINT	4	1000	0	2000000000	0	kVAR
	394	UVARGInhibitTime	Under Total Reactive Power Generated (-kVAR) Inhibit Time	USINT	1	1	0	250	10	Sec
	395	UVARGTripDelay	Under Total Reactive Power Generated (-kVAR) Trip Delay	USINT	1	10	1	250	10	Sec
	396	UVARGTripLevel	Under Total Reactive Power Generated (-kVAR) Trip Level	DINT	4	1000	-2000000000	0	0	kVAR
	397	UVARGWarnLevel	Under Total Reactive Power Generated (-kVAR) Warning Level	DINT	4	1000	-2000000000	0	0	kVAR
	398	OVARGInhibitTime	Over Total Reactive Power Generated (-kVAR) Inhibit Time	USINT	1	1	0	250	10	Sec
	399	OVARGTripDelay	Over Total Reactive Power Generated (-kVAR) Trip Delay	USINT	1	10	1	250	10	Sec
	400	OVARGTripLevel	Over Total Reactive Power Generated (-kVAR) Trip Level	DINT	4	1000	-2000000000	0	0	kVAR
	401	OVARGWarnLevel	Over Total Reactive Power Generated (-kVAR) Warning Level	DINT	4	1000	-2000000000	0	0	kVAR
	402	UVAInhibitTime	Under Total Apparent Power Inhibit Time	USINT	1	1	0	250	10	Sec
	403	UVATripDelay	Under Total Apparent Power Trip Delay	USINT	1	10	1	250	10	Sec
	404	UVATripLevel	Under Total Apparent Power Trip Level	DINT	4	1000	0	2000000000	0	kVA
	405	UVAWarningLevel	Under Total Apparent Power Warning Level	DINT	4	1000	0	2000000000	0	kVA
	406	OVAInhibitTime	Over Total Apparent Power Inhibit Time	USINT	1	1	0	250	10	Sec

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Power Setup (Continued)	407	OVATripDelay	Over Total Apparent Power Trip Delay	USINT	1	10	1	250	10	Sec
	408	OVATripLevel	Over Total Apparent Power Trip Level	DINT	4	1000	0	2000000000	0	kVA
	409	OVAWarningLevel	Over Total Apparent Power Warning Level	DINT	4	1000	0	2000000000	0	kVA
	410	UPFLagInhibTime	Under Total Power Factor Lagging (-PF) Inhibit Time	USINT	1	1	0	250	10	Sec
	411	UPFLagTripDelay	Under Total Power Factor Lagging (-PF) Trip Delay	USINT	1	10	1	250	10	Sec
	412	UPFLagTripLevel	Under Total Power Factor Lagging (-PF) Trip Level	SINT	1	1	-100	0	-90	%
	413	UPFLagWarnLevel	Under Total Power Factor Lagging (-PF) Warning Level	SINT	1	1	-100	0	-95	%
	414	OPFLagInhibTime	Over Total Power Factor Lagging (-PF) Inhibit Time	USINT	1	1	0	250	10	Sec
	415	OPFLagTripDelay	Over Total Power Factor Lagging (-PF) Trip Delay	USINT	1	10	1	250	10	Sec
	416	OPFLagTripLevel	Over Total Power Factor Lagging (-PF) Trip Level	SINT	1	1	-100	0	-95	%
	417	OPFLagWarnLevel	Over Total Power Factor Lagging (-PF) Warning Level	SINT	1	1	-100	0	-90	%
	418	UPFLeadInhibTime	Under Total Power Factor Leading (+PF) Inhibit Time	USINT	1	1	0	250	10	Sec
	419	UPFLeadTripDelay	Under Total Power Factor Leading (+PF) Trip Delay	USINT	1	10	1	250	10	Sec
	420	UPFLeadTripLevel	Under Total Power Factor Leading (+PF) Trip Level	USINT	1	1	0	100	90	%
	421	UPFLeadWarnLevel	Under Total Power Factor Leading (+PF) Warning Level	USINT	1	1	0	100	95	%
	422	OPFLeadInhibTime	Over Total Power Factor Leading (+PF) Inhibit Time	USINT	1	1	0	250	10	Sec
	423	OPFLeadTripDelay	Over Total Power Factor Leading (+PF) Trip Delay	USINT	1	10	1	250	10	Sec
	424	OPFLeadTripLevel	Over Total Power Factor Leading (+PF) Trip Level	USINT	1	1	0	100	95	%
	425	OPFLeadWarnLevel	Over Total Power Factor Leading (+PF) Warning Level	USINT	1	1	0	100	90	%
	426	DemandPeriod	The number of minutes in a specific demand period	USINT	1	1	1	255	15	Min
	427	NumberOfPeriods	The number of periods to average for the demand calculation	USINT	1	1	1	15	1	
Diagnostic Display Setup	428	Screen1Param1	Parameter to display on Operator Station Startup screen 1 line 1	UINT	2	1	0	560	1	
	429	Screen1Param2	Parameter to display on Operator Station Startup screen 1 line 2	UINT	2	1	0	560	50	
	430	Screen2Param1	Parameter to display on Operator Station Startup screen 2 line 1	UINT	2	1	0	560	2	
	431	Screen2Param2	Parameter to display on Operator Station Startup screen 2 line 2	UINT	2	1	0	560	3	
	432	Screen3Param1	Parameter to display on Operator Station Startup screen 3 line 1	UINT	2	1	0	560	51	
	433	Screen3Param2	Parameter to display on Operator Station Startup screen 3 line 2	UINT	2	1	0	560	52	
	434	Screen4Param1	Parameter to display on Operator Station Startup screen 4 line 1	UINT	2	1	0	560	38	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Diagnostic Display Setup (Continued)	435	Screen4Param2	Parameter to display on Operator Station Startup screen 4 line 2	UINT	2	1	0	560	39	
	436	DisplayTimeout	Inactivity time for a Diagnostic Station	UINT	2	1	0	65535	300	
Analog1 Setup	437	InAnMod1Ch00Type	Assignment for Analog Module 1 Input Channel 00 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	438	InAMod1Ch0Format	Assignment for Analog Module 1 Input Channel 00 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	439	InAMod1C0TmpUnit	Assignment for Analog Module 1 Input Channel 00 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	440	InAMod1C0FiltFrq	Assignment for Analog Module 1 Input Channel 00 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	441	InAMod1C0OpCktSt	Indicates Analog Module 1 Input Channel 00 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	442	InAnMod1Ch0RTDEn	Enable Analog Module 1 Input Channel 00 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	443	InAMod1C0TripDly	Analog Module 1 Input Channel 00 Trip Delay	USINT	1	10	0	250	10	Sec
	444	InAMod1C0TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	445	InAMod1C0WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog1 Setup (Continued)	446	InAnMod1Ch01Type	Assignment for Analog Module 1 Input Channel 01 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	447	InAMod1Ch1Format	Assignment for Analog Module 1 Input Channel 01 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID 4= PercentRange		0	
	448	InAMod1C1TmpUnit	Assignment for Analog Module 1 Input Channel 01 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	449	InAMod1C1FiltFrq	Assignment Analog Module 1 Input Channel 01 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	450	InAMod1C1OpCktSt	Indicates Analog Module 1 Input Channel 01 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	451	InAnMod1Ch1RTDEn	Enable Analog Module 1 Input Channel 01 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	452	InAMod1C1TripDly	Analog Module 1 Input Channel 01 Trip Delay	USINT	1	10	0	250	10	Sec
	453	InAMod1C1TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	454	InAMod1C1WarnLvl	Level (in selected Units) where Analog Input generate	UINT	2	1	0	65535	0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog1 Setup (Continued)	455	InAnMod1Ch02Type	Assignment for Analog Module 1 Input Channel 02 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	456	InAMod1Ch2Format	Assignment for Analog Module 1 Input Channel 02 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	457	InAMod1C2TmpUnit	Assignment for Analog Module 1 Input Channel 02 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	458	InAMod1C2FiltFrq	Assignment Analog Module 1 Input Channel 02 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	459	InAMod1C2OpCktSt	Indicates Analog Module 1 Input Channel 02 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	460	InAnMod1Ch2RTDEn	Enable Analog Module 1 Input Channel 02 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	461	InAMod1C2TripDly	Analog Module 1 Input Channel 02 Trip Delay	USINT	1	10	0	250	10	Sec
	462	InAMod1C2TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	463	InAMod1C2WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	464	OutAnMod1Type	Assignment for Analog Module 1 Output function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4=1to5 Volts 5= 0to5 Volts		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog1 Setup (continued)	465	OutAnMod1Select	Assignment of parameter data value to drive Analog Module 1 Output	USINT	1	1	0= AveragePctFLA 1= ScaledAvgPctFLA 2= PercentTCU 3= GFCurrent 4= CurrentUnbalance 5= AvgLLVoltage 6=VoltLLUnbalance 7= TotalkW 8= TotalkVA 9= TotalkVAR 10= TotalPF 11= UserDLXData		0	
	466	OutAnMod1FltActn	Analog Module 1 Output action on comms fault	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= Hold Last State		0	
	467	OutAnMod1IdlActn	Analog Module 1 Output action on comms idle	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= Hold Last State		0	
Analog2 Setup	468	InAnMod2Ch00Type	Assignment for Analog Module 2 Input Channel 00 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	469	InAMod2Ch0Format	Assignment for Analog Module 2 Input Channel 00 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	470	InAMod2C0TmpUnit	Assignment for Analog Module 2 Input Channel 00 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	471	InAMod2C0FiltFrq	Assignment for Analog Module 2 Input Channel 00 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog2 Setup (Continued)	472	InAMod2C0OpCktSt	Indicates Analog Module 2 Input Channel 00 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	473	InAnMod2Ch0RTDEn	Enable Analog Module 2 Input Channel 00 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	474	InAMod2C0TripDly	Analog Module 2 Input Channel 00 Trip Delay	USINT	1	10	0	250	10	Sec
	475	InAMod2C0TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	476	InAMod2C0WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	477	InAnMod2Ch01Type	Assignment for Analog Module 2 Input Channel 01 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	478	InAMod2Ch1Format	Assignment for Analog Module 2 Input Channel 01 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	479	InAMod2C1TmpUnit	Assignment for Analog Module 2 Input Channel 01 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	480	InAMod2C1FiltFrq	Assignment Analog Module 2 Input Channel 01 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	481	InAMod2C1OpCktSt	Indicates Analog Module 2 Input Channel 01 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	482	InAnMod2Ch1RTDEn	Enable Analog Module 2 Input Channel 01 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	483	InAMod2C1TripDly	Analog Module 2 Input Channel 01 Trip Delay	USINT	1	10	0	250	10	Sec
	484	InAMod2C1TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog2 Setup (continued)	485	InAMod2C1WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	486	InAnMod2Ch02Type	Assignment for Analog Module 2 Input Channel 02 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	487	InAMod2Ch2Format	Assignment for Analog Module 2 Input Channel 02 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	488	InAMod2C2TmpUnit	Assignment for Analog Module 2 Input Channel 02 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	489	InAMod2C2FiltFrq	Assignment Analog Module 2 Input Channel 02 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	490	InAMod2C2OpCktSt	Indicates Analog Module 2 Input Channel 02 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	491	InAnMod2Ch2RTDEn	Enable Analog Module 2 Input Channel 02 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	492	InAMod2C2TripDly	Analog Module 2 Input Channel 02 Trip Delay	USINT	1	10	0	250	10	Sec
	493	InAMod2C2TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	494	InAMod2C2WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	495	OutAnMod2Type	Assignment for Analog Module 2 Output function.	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4=ITo5 Volts 5=0To5 Volts		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog2 Setup (continued)	496	OutAnMod2Select	Assignment of parameter data value to drive Analog Module 2 Output	USINT	1	1	0= AveragePctFLA 1= ScaledAvgPctFLA 2= PercentTCU 3= GFCurrent 4= CurrentUnbalance 5= AvgLLVoltage 6=VoltLLUnbalance 7= TotalkW 8= TotalkVA 9= TotalkVAR 10= TotalPF 11= UserDLXData		0	
	497	OutAnMod2FltActn	Analog Module 2 Output action on comms fault	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= HoldLastState		0	
Analog3 Setup	498	OutAnMod2IdlActn	Analog Module 2 Output action on comms idle	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= HoldLastState		0	
	499	InAnMod3Ch00Type	Assignment for Analog Module 3 Input Channel 00 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	500	InAMod3Ch0Format	Assignment for Analog Module 3 Input Channel 00 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	501	InAMod3C0TmpUnit	Assignment for Analog Module 3 Input Channel 00 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	502	InAMod3C0FiltFrq	Assignment for Analog Module 3 Input Channel 00 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog3 Setup (Continued)	503	InAMod3C0OpCktSt	Indicates Analog Module 3 Input Channel 00 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	504	InAnMod3Ch0RTDEn	Enable Analog Module 3 Input Channel 00 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	505	InAMod3C0TripDly	Analog Module 3 Input Channel 00 Trip Delay	USINT	1	10	0	250	10	Sec
	506	InAMod3C0TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	507	InAMod3C0WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	508	InAnMod3Ch01Type	Assignment for Analog Module 3 Input Channel 01 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	509	InAMod3Ch1Format	Assignment for Analog Module 3 Input Channel 01 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	510	InAMod3C1TmpUnit	Assignment for Analog Module 3 Input Channel 01 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	511	InAMod3C1FiltFrq	Assignment Analog Module 3 Input Channel 01 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	512	InAMod3C1OpCktSt	Indicates Analog Module 3 Input Channel 01 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	513	InAnMod3Ch1RTDEn	Enable Analog Module 3 Input Channel 01 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	514	InAMod3C1TripDly	Analog Module 3 Input Channel 01 Trip Delay	USINT	1	10	0	250	10	Sec
	515	InAMod3C1TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog3 Setup (continued)	516	InAMod3C1WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	517	InAnMod3Ch02Type	Assignment for Analog Module 3 Input Channel 02 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	518	InAMod3Ch2Format	Assignment for Analog Module 3 Input Channel 02 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	519	InAMod3C2TmpUnit	Assignment for Analog Module 3 Input Channel 02 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	520	InAMod3C2FiltFrq	Indicates Analog Module 3 Input Channel 02 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	521	InAMod3C2OpCktSt	Indicates Analog Module 3 Input Channel 02 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	522	InAnMod3Ch2RTDEn	Enable Analog Module 3 Input Channel 02 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	523	InAMod3C2TripDly	Analog Module 3 Input Channel 02 Trip Delay	USINT	1	10	0	250	10	Sec
	524	InAMod3C2TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	525	InAMod3C2WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	526	OutAnMod3Type	Assignment for Analog Module 3 Output function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4=1to5 Volts 5=0to5 Volts		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog3 Setup (continued)	527	OutAnMod3Select	Assignment of parameter data value to drive Analog Module 3 Output	USINT	1	1	0= AveragePctFLA 1= ScaledAvgPctFLA 2= PercentTCU 3= GFCurrent 4= CurrentUnbalance 5= AvgLLVoltage 6=VoltLLUnbalance 7= TotalkW 8= TotalkVA 9= TotalkVAR 10= TotalPF 11= UserDLXData		0	
	528	OutAnMod3FltActn	Analog Module 3 Output action on comms fault	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= HoldLastState		0	
	529	OutAnMod3IdlActn	Analog Module 3 Output action on comms idle	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= HoldLastState		0	
Analog4 Setup	530	InAnMod4Ch00Type	Assignment for Analog Module 4 Input Channel 00 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	531	InAMod4Ch0Format	Assignment for Analog Module 4 Input Channel 00 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	532	InAMod4C0TmpUnit	Assignment for Analog Module 4 Input Channel 00 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	533	InAMod4C0FiltFrq	Assignment for Analog Module 4 Input Channel 00 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog4 Setup (continued)	534	InAMod4C0OpCktSt	Indicates Analog Module 4 Input Channel 00 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	535	InAnMod4Ch0RTDEn	Enable Analog Module 4 Input Channel 00 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	536	InAMod4C0TripDly	Analog Module 4 Input Channel 00 Trip Delay	USINT	1	10	0	250	10	Sec
	537	InAMod4C0TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	538	InAMod4C0WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	539	InAnMod4Ch01Type	Assignment for Analog Module 4 Input Channel 01 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	540	InAMod4Ch1Format	Assignment for Analog Module 4 Input Channel 01 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	541	InAMod4C1TmpUnit	Module 4 Input Channel 01 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	542	InAMod4C1FiltFrq	Assignment Analog Module 4 Input Channel 01 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	543	InAMod4C1OpCktSt	Indicates Analog Module 4 Input Channel 01 Open Circuit State	USINT	1	1	0=Upscale 1=Downscale 2=Zero		0	
	544	InAnMod4Ch1RTDEn	Enable Analog Module 4Input Channel 01 to function with RTD	BOOL	1	1	0=3-wire 1=2-wire		0	
	545	InAMod4C1TripDly	Analog Module 4 Input Channel 01 Trip Delay	USINT	1	10	0	250	10	Sec
	546	InAMod4C1TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog4 Setup (continued)	547	InAMod4C1WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	548	InAnMod4Ch02Type	Assignment for Analog Module 4 Input Channel 02 function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts 6= 100Pt385 7= 200Pt385 8= 500Pt385 9= 1000Pt385 10=100Pt3916 11= 200Pt3916 12= 500Pt3916 13= 1000Pt3916 14= 10Cu426 15= 120Ni618 16= 120Ni672 17= 604NiFe518 18= 150ohm 19= 1000ohm 20 = 3000ohm 21= 6000ohm		0	
	549	InAMod4Ch2Format	Assignment for Analog Module 4 Input Channel 02 Data Format	USINT	1	1	0= EngUnits 1= EngUnitsTimes10 2= RawProportional 3= ScaledForPID		0	
	550	InAMod4C2TmpUnit	Assignment for Analog Module 4 Input Channel 02 Temperature Units	USINT	1	1	0=DegreesC 1=DegreesF		0	
	551	InAMod4C2FiltFrq	Indicates Analog Module 4 Input Channel 02 Filter Freq	USINT	1	1	0=17Hz 1=4Hz 2=62Hz 3=470Hz		0	
	552	InAMod4C2OpCktSt	Indicates Analog Module 4 Input Channel 02 Open Circuit State	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= HoldLastState		0	
	553	InAnMod4Ch2RTDEn	Enable Analog Module 4 Input Channel 02 to function with RTD	BOOL	1	1	0=Disable 1=Enable		0	
	554	InAMod4C2TripDly	Analog Module 4 Input Channel 02 Trip Delay	USINT	1	10	0	250	10	Sec
	555	InAMod4C2TripLvl	Level (in selected Units) where Analog Input generates a trip	UINT	2	1	0	65535	0	
	556	InAMod4C2WarnLvl	Level (in selected Units) where Analog Input generates a warning	UINT	2	1	0	65535	0	
	557	OutAnMod4Type	Assignment for Analog Module 4 Output function	USINT	1	1	0= Disabled 1= 4To20mA 2= 0To20mA 3= 0To10Volts 4= 1To5Volts 5= 0To5Volts		0	

Group	Param No.	Parameter Name	Description	Type	Data Size (bytes)	Scale Factor	Min	Max	Default	Units
Analog4 Setup (continued)	558	OutAnMod4Select	Assignment of parameter data value to drive Analog Module 4 Output	USINT	1	1	0= AveragePctFLA 1= ScaledAvgPctFLA 2= PercentTCU 3= GFCurrent 4= CurrentUnbalance 5= AvgLLVoltage 6=VoltLLUnbalance 7= TotalkW 8= TotalkVA 9= TotalkVAR 10= TotalPF 11= UserDLXData		0	
	559	OutAnMod4FltActn	Analog Module 4 Output action on comms fault	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= HoldLastState		0	
	560	OutAnMod4IdlActn	Analog Module 4Output action on comms idle	USINT	1	1	0= Zero 1= Maximum 2= Minimum 3= HoldLastState		0	

EtherNet/IP Information

Common Industrial Protocol (CIP) Objects

The CEP9 Electronic Overload Relay's EtherNet/IP Communication Module supports the following Common Industrial Protocol (CIP).

Table 355 - CIP Object Classes

Class	Object
0x0001	Identity
0x0002	Message Router
0x0003	DeviceNet
0x0004	Assembly
0x0005	Connection
0x0008	Discrete Input Point
0x0009	Discrete Output Point
0x000A	Analog Input Point
0x000B	Analog Output Point
0x000F	Parameter Object
0x0010	Parameter Group Object
0x001E	Discrete Output Group
0x0029	Control Supervisor
0x002B	Acknowledge Handler
0x002C	Overload Object
0x0037	File Object
0x004E	Base Energy Object
0x004F	Electrical Energy Object
0x008B	Wall Clock Time Object
0x0097	DPI Fault Object
0x0098	DPI Warning Object
0x00C2	MCC Object
0x0375	Status Reporting Object

Identity Object — CLASS CODE 0x0001

The following three instances of the Identity Object are supported:

Table 356 - Identity Object Instances

Instance	Name	Revision Attribute
1	Operating System Flash	The firmware rev of the Control firmware stored in flash memory
2	Boot code Flash	The firmware rev of the Boot Code stored in flash memory
3	Sensing Module	The firmware rev of the Sensing Module firmware

The following class attributes are supported for the Identity Object:

Table 357 - Identity Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1

Instance 1 of the Identity Object contains the following attributes:

Table 358 - Identity Object Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Vendor	UINT	625= Sprecher + Schuh
2	Get	Device Type	UINT	3
3	Get	Product Code	UINT	651
4	Get	Revision Major Revision Minor Revision	Structure of: USINT USINT	Firmware revision of the Control firmware
5	Get	Status	WORD	Bit 0 – 0=not owned; 1=owned by master Bit 2 – 0=Factory Defaulted; 1=Configured Bits 4-7 – Extended Status (see Table 359) Bit 8 – Minor Recoverable fault Bit 9 – Minor Unrecoverable fault Bit 10 – Major Recoverable fault Bit 11 – Major Unrecoverable fault
6	Get	Serial Number	UDINT	unique number for each device
7	Get	Product Name String Length ASCII String	Structure of: USINT STRING	"CEP9-EIO Application"
8	Get	State	USINT	See CIP Common Spec
9	Get	Configuration Consistency Value	UINT	16 bit CRC or checksum of all data included in the following data sets: Parameter included in the configuration assembly MCC Object configuration data DeviceLogix program data Base Energy Object attribute 16

Table 359 - Extended Device Status Field (bits 4-7) in "Status" Instance Attribute 5

Value	Description
0	Self-Testing or Unknown
1	Firmware Update in Progress
2	At least one faulted I/O connection
3	No I/O connections established
4	Non-Volatile Configuration bad
5	Major Fault – either bit 10 or bit 11 is true (1)
6	At least one I/O connection in run mode
7	At least one I/O connection established, all in idle mode

Instance 2 of the Identity Object contains the following attributes:

Table 360 - Identity Object Instance 2 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Vendor	UINT	625= Sprecher + Schuh
2	Get	Device Type	UINT	3
3	Get	Product Code	UINT	651
4	Get	Revision Major Revision Minor Revision	Structure of: USINT USINT	Firmware revision of the Boot Code
5	Get	Status	WORD	Bit 0 – 0=not owned; 1=owned by master Bit 2 – 0=Factory Defaulted; 1=Configured Bits 4-7 – Extended Status (see Table 359) Bit 8 – Minor Recoverable fault Bit 9 – Minor Unrecoverable fault Bit 10 – Major Recoverable fault Bit 11 – Major Unrecoverable fault
6	Get	Serial Number	UDINT	unique number for each device
7	Get	Product Name String Length ASCII String	Structure of: USINT STRING	"CEP9-EIO Boot Code"
8	Get	State	USINT	See CIP Common Spec
9	Get	Configuration Consistency Value	UINT	16 bit CRC or checksum of all data included in the following data sets: Parameter included in the configuration assembly MCC Object configuration data DeviceLogix program data Base Energy Object attribute 16

Instance 3 of the Identity Object contains the following attributes:

Table 361 - Identity Object Instance 3 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Vendor	UINT	625= Sprecher + Schuh
2	Get	Device Type	UINT	3
3	Get	Product Code	UINT	651
4	Get	Revision Major Revision Minor Revision	Structure of: USINT USINT	Firmware revision of the Sensing Module firmware
5	Get	Status	WORD	Bit 0 – 0=not owned; 1=owned by master Bit 2 – 0=Factory Defaulted; 1=Configured Bits 4-7 – Extended Status (see Table 359) Bit 8 – Minor Recoverable fault Bit 9 – Minor Unrecoverable fault Bit 10 – Major Recoverable fault Bit 11 – Major Unrecoverable fault
6	Get	Serial Number	UDINT	unique number for each device
7	Get	Product Name String Length ASCII String	Structure of: USINT STRING	"CEP9-EIO Sensing Module"
8	Get	State	USINT	See CIP Common Spec
9	Get	Configuration Consistency Value	UINT	16 bit CRC or checksum of all data included in the following data sets: Parameter included in the configuration assembly MCC Object configuration data DeviceLogix program data Base Energy Object attribute 16

The following common services are implemented for the Identity Object.

Table 362 - Identity Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x05	No	Yes	Reset

Message Router — CLASS CODE 0x0002

No class or instance attributes are supported. The message router object exists only to rout explicit messages to other objects.

Assembly Object — CLASS CODE 0x0004

The following class attributes are supported for the Assembly Object:

Table 363 - Assembly Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
2	Get	Max. Instance	UINT	199

The following static assembly instance attributes are supported for each assembly instance.

Table 364 - Assembly Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Number of Members in Member List	UINT	
2	Get	Member List	Array of STRUCT	Array of CIP paths
		Member Data Description	UINT	Size of Member Data in bits
		Member Path Size	UINT	Size of Member Path in bytes
		Member Path	Packed EPATH	Member EPATHs for each assembly instance
3	Conditional	Data	Array of BYTE	
4	Get	Size	UINT	Number of bytes in attribute 3
100	Get	Name String	STRING	

The following services are implemented for the Assembly Object.

Table 365 - Assembly Object Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

The following table summarizes the various instances of the Assembly Object that are implemented:

Table 366 - Assembly Object Instance Summary

Inst	Type	Name	Description
2	Consumed	Trip Reset Cmd	Required ODVA Consumed Instance
50	Produced	Trip Status	Required ODVA Produced Instance
120	Config	Configuration	Configuration Assembly
144	Consumed	CEP9 Consumed	Default Consumed Assembly
198	Produced	Current Diags	Produced Assembly with Current Diagnostics Only
199	Produced	All Diags	Default Produced Assembly

Instance 2

The following table summarizes Attribute 3 Format:

Table 367 - Instance 2 — Basic Overload Output Assembly from ODVA Profile

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Fault Reset		

Table 368 - Instance 2 Attributes

Attribute ID	Access Rule	Member Index	Name	Data Type	Value
1	Get		Number of Members in Member List	UINT	2
2	Get		Member List	Array of STRUCT	
		0	Member Data Description	UINT	2
			Member Path Size	UINT	0
			Member Path	Packed EPATH	
		1	Member Data Description	UINT	1
			Member Path Size	UINT	12
			Member Path	Packed EPATH	6BH & “Fault Reset”
3	Set		Data	UINT	See data format above
4	Get		Size	UINT	1
100	Get		Name	SHORT_STRING	“Trip Reset Cmd”

Instance 50

The following table summarizes Attribute 3 Format:

Table 369 - Instance 50 — Basic Overload Input Assembly from ODVA Overload Profile

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								Tripped

Table 370 - Instance 50 Attributes

Attribute ID	Access Rule	Member Index	Name	Data Type	Value
1	Get		Number of Members in Member List	UINT	1
2	Get		Member List	Array of STRUCT	
		0	Member Data Description	UINT	1
			Member Path Size	UINT	8
			Member Path	Packed EPATH	67H & “Tripped”
3	Get		Data	UINT	See data format above
4	Get		Size	UINT	1
100	Get		Name	SHORT_STRING	“Trip Status”

Instance 120 - Configuration Assembly Revision 2

The following table shows Attribute 3 Format and Attribute 2 Member List for revision 2 of the assembly.

Table 371 - Instance 120 — Configuration Assembly

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
0	0	ConfigAssyRev = 2																16	1100
1										SetOperatingMode								8	195
		Reserved																8	1102

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
2	1	FLASetting																32	171
3																			
4	2	FLA2Setting																32	177
5																			
6	3									TripClass								8	172
									X	OLPTCResetMode								1	173
								X		SingleOrThreePh								1	176
							X			GFFilter								1	247
						X				GFMaxInghibit								1	248
				X	X					PhaseRotTrip								1	364
			X							PowerScale								1	377
		X								Reserved								2	1101
7										OLResetLevel								8	174
		OLWarningLevel																8	175
8	4	TripEnableI																16	183
9		WarningEnableI																16	189
10	5	TripEnableV																16	184
11		WarningEnableV																16	190
12	6	TripEnableP																16	185
13		WarningEnableP																16	191
14	7	TripEnableC																16	186
15		WarningEnableC																16	192
16	8	TripEnableA																16	187
17		WarningEnableA																16	CEP9
18	9	TripHistoryMaskI																16	139
19		WarnHistoryMaskI																16	145
20	10	TripHistoryMaskV																16	140
21		WarnHistoryMaskV																16	146
22	11	TripHistoryMaskP																16	141
23		WarnHistoryMaskP																16	147
24	12	TripHistoryMaskC																16	142
25		WarnHistoryMaskC																16	148
26	13	TripHistoryMaskA																16	143
27		WarnHistoryMaskA																16	149
28	14	MismatchAction																16	233
29										ControlModuleTyp								8	221
		SensingModuleTyp																8	222
30	15													OperStationType				4	224
											X	X	X	DigitalMod1Type				3	225
								X	X	X				DigitalMod2Type				3	226
					X	X	X							DigitalMod3Type				3	227
		X	X	X										DigitalMod4Type				3	228
31		AnalogMod1Type														X	X	2	229
		AnalogMod2Type												X	X			2	230
		AnalogMod3Type										X	X					2	231
		AnalogMod4Type								X	X							2	232
		Reserved																8	NA

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
32	16													Language				4	212
										OutAAssignment								4	202
						OuBAssignment												4	203
		OutCAssignment																4	204
33														InPt00Assignment				4	196
										InPt01Assignment								4	197
						InPt02Assignment												4	198
		InPt03Assignment																4	199
34	17													InPt04Assignment				4	200
										InPt05Assignment								4	201
						ActFLA2wOutput												4	209
					X	EmergencyStartEn												4	216
		X	X	X	Reserved													4	NA
35										StartsPerHour								8	205
		Reserved																8	NA
36	18	StartsInterval																16	206
37		PMTotalStarts																16	207
38	19	PMOperatingHours																16	208
39		FeedbackTimeout																16	213
40	20	TransitionDelay																16	214
41		InterlockDelay																16	215
42	21									GroundFaultType								8	241
		GFInhibitTime																8	242
43										GFTripDelay								8	243
		GFWarningDelay																8	245
44	22	GFTripLevel																16	244
45		GFWarningLevel																16	246
46	23									PLInhibitTime								8	239
		PLTripDelay																8	240
47										StallEnabledTime								8	249
		Reserved																8	NA
48	24	StallTripLevel																16	250
49										JamInhibitTime								8	251
		JamTripDelay																8	252
50	25	JamTripLevel																16	253
51		JamWarningLevel																16	254
52	26									ULInhibitTime								8	255
		ULTripDelay																8	256
53										ULTripLevel								8	257
		ULWarningLevel																8	258
54	27									CIInhibitTime								8	259
		CITripDelay																8	260
55										CITripLevel								8	261
		CIWarningLevel																8	262
56	28	CTPrimary																16	263
57		CTSecondary																16	264
58	29									UCInhibitTime								8	265
		L1UCTripDelay																8	266
59										L1UCTripLevel								8	267
		L1UCWarningLevel																8	268

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
60	30									L2UCTripDelay								8	269
		L2UCTripLevel																8	270
61										L2UCWarningLevel								8	271
		L3UCTripDelay																8	272
62	31									L3UCTripLevel								8	273
		L3UCWarningLevel																8	274
63										OCInhibitTime								8	275
		L1OCTripDelay																8	276
64	32									L1OCTripLevel								8	277
		L1OCWarningLevel																8	278
65										L2OCTripDelay								8	279
		L2OCTripLevel																8	280
66	33									L2OCWarningLevel								8	281
		L3OCTripDelay																8	282
67										L3OCTripLevel								8	283
		L3OCWarningLevel																8	284
68	34									LineLossInhTime								8	285
		L1LossTripDelay																8	286
69										L2LossTripDelay								8	287
		L3LossTripDelay																8	288
70	35	Datalink0																16	291
71		Datalink1																16	292
72	36	Datalink2																16	293
73		Datalink3																16	294
74	37	Datalink4																16	295
75		Datalink5																16	296
76	38	Datalink6																16	297
77		Datalink7																16	298

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
78	39	OutPt00PrFltAct															X	1	304
		OutPt00PrFltVal														X		1	305
		OutPt00ComFltAct													X			1	306
		OutPt00ComFltVal												X				1	307
		OutPt00ComIdlAct											X					1	308
		OutPt00ComIdlVal										X						1	309
		OutPt01PrFltAct									X							1	310
		OutPt01PrFltVal								X								1	311
									X	OutPt01ComFltAct								1	312
								X		OutPt01ComFltVal								1	313
							X			OutPt01ComIdlAct								1	314
						X				OutPt01ComIdlVal								1	315
					X					OutPt02PrFltAct								1	316
				X						OutPt02PrFltVal								1	317
			X							OutPt02ComFltAct								1	318
		X								OutPt02ComFltVal								1	319
79		OutPt02ComIdlAct															X	1	320
		OutPt02ComIdlVal														X		1	321
		OutDig1PrFltAct													X			1	322
		OutDig1PrFltVal												X				1	323
		OutDig1ComFltAct											X					1	324
		OutDig1ComFltVal										X						1	325
		OutDig1ComIdlAct									X							1	326
		OutDig1ComIdlVal								X								1	327
									X	OutDig2PrFltAct								1	328
								X		OutDig2PrFltVal								1	329
							X			OutDig2ComFltAct								1	330
						X				OutDig2ComFltVal								1	331
					X					OutDig2ComIdlAct								1	332
				X						OutDig2ComIdlVal								1	333
			X							OutDig3PrFltAct								1	334
		X								OutDig3PrFltVal								1	335
80	40	OutDig3ComFltAct															X	1	336
		OutDig3ComFltVal														X		1	337
		OutDig3ComIdlAct													X			1	338
		OutDig3ComIdlVal												X				1	339
		OutDig4PrFltAct											X					1	340
		OutDig4PrFltVal										X						1	341
		OutDig4ComFltAct									X							1	342
		OutDig4ComFltVal								X								1	343
									X	OutDig4ComIdlAct								1	344
								X		OutDig4ComIdlVal								1	345
							X			CommOverride								1	346
						X				NetworkOverride								1	347
		Reserved																4	NA
81		PtDevOutCOSMask																16	350
82	41	PTPrimary																16	353
83		PTSecondary																16	354

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
84	42									VoltageMode								8	352
		PhRotInhibitTime																8	363
85										UVInhibitTime								8	355
		UVTripDelay																8	356
86	43	UVTripLevel																16	357
87		UVWarningLevel																16	358
88	44									OVInhibitTime								8	359
		OVTripDelay																8	360
89		OVTripLevel																16	361
90	45	OVWarningLevel																16	362
91										VUBInhibitTime								8	365
		VUBTripDelay																8	366
92	46									VUBTripLevel								8	367
		VUBWarningLevel																8	368
93										UFInhibitTime								8	369
		UFTripDelay																8	370
94	47									UFTripLevel								8	371
		UFWarningLevel																8	372
95										OFInhibitTime								8	373
		OFTripDelay																8	374
96	48									OFTripLevel								8	375
		OFWarningLevel																8	376
97										DemandPeriod								8	426
		NumberOfPeriods																8	427
98	49									UWInhibitTime								8	378
		UWTripDelay																8	379
99										OWInhibitTime								8	382
		OWTripDelay																8	383
100	50	UWTripLevel																32	380
101																			
102	51	UWWarningLevel																32	381
103																			
104	52	OWTripLevel																32	384
105																			
106	53	OWWarningLevel																32	385
107																			
108	54									UVARCInhibitTime								8	386
		UVARCTripDelay																8	387
109										OVARCInhibitTime								8	390
		OVARCTripDelay																8	391
110	55	UVARCTripLevel																32	388
111																			
112	56	UVARCWarnLevel																32	389
113																			
114	57	OVARCTripLevel																32	392
115																			
116	58	OVARCWarnLevel																32	393
117																			

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
118	59									UVARGInhibitTime								8	394
		UVARGTripDelay																8	395
119										OVARGInhibitTime								8	398
		OVARGTripDelay																8	399
120	60	UVARGTripLevel																32	396
121																			
122	61	UVARGWarnLevel																32	397
123																			
124	62	OVARGTripLevel																32	400
125																			
126	63	OVARGWarnLevel																32	401
127																			
128	64									UVAInhibitTime								8	402
		UVATripDelay																8	403
129										OVAInhibitTime								8	406
		OVATripDelay																8	407
130	65	UVATripLevel																32	404
131																			
132	66	UVAWarningLevel																32	405
133																			
134	67	OVATripLevel																32	408
135																			
136	68	OVAWarningLevel																32	409
137																			
138	69									UPFLagInhibTime								8	410
		UPFLagTripDelay																8	411
139										UPFLagTripLevel								8	412
		UPFLagWarnLevel																8	413
140	70									OPFLagInhibTime								8	414
		OPFLagTripDelay																8	415
141										OPFLagTripLevel								8	416
		OPFLagWarnLevel																8	417
142	71									UPFLeadInhibTime								8	418
		UPFLeadTripDelay																8	419
143										UPFLeadTripLevel								8	420
		UPFLeadWarnLevel																8	421
144	72									OPFLeadInhibTime								8	422
		OPFLeadTripDelay																8	423
145										OPFLeadTripDelay								8	424
		OPFLeadWarnLevel																8	425
146	73	Screen1Param1																16	428
147		Screen1Param2																16	429
148	74	Screen1Param3																16	430
149		Reserved																16	1103
150	75	Reserved																16	1103
151		Reserved																16	1103
152	76	Reserved																16	1103
153		Reserved																16	1103
154	77	Reserved																16	1103
155		Reserved																16	1103

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
156	78									InAMod1C0TripDly								8	443
		InAMod1C1TripDly																8	452
157										InAMod1C2TripDly								8	461
		Reserved																8	1102
158	79	InAMod1C0TripLvl																16	444
159		InAMod1C0WarnLvl																16	445
160	80	InAMod1C1TripLvl																16	453
161		InAMod1C1WarnLvl																16	454
162	81	InAMod1C2TripLvl																16	462
163		InAMod1C2WarnLvl																16	463
164	82												InAnMod1Ch00Type					5	437
								InAnMod1Ch01Type										5	446
			InAnMod1Ch02Type															5	455
		X	Reserved															1	1101
165										OutAnMod1Select								8	465
							X	X	X	InAMod1Ch0Format								3	438
				X	X	X				InAMod1C0FiltFrq								3	440
		X	X							InAMod1C0OpCktSt								2	441
166	83	InAMod1Ch1Format													X	X	X	3	447
		InAMod1C1FiltFrq										X	X	X				3	449
		InAMod1C1OpCktSt								X	X							2	450
							X	X	X	InAMod1Ch2Format								3	456
				X	X	X				InAMod1C2FiltFrq								3	458
		X	X							InAMod1C2OpCktSt								2	459
167		InAMod1C0TmpUnit															X	1	439
		InAnMod1Ch0RTDEn														X		1	442
		InAMod1C1TmpUnit													X			1	448
		InAnMod1Ch1RTDEn												X				1	451
		InAMod1C2TmpUnit											X					1	457
		InAnMod1Ch2RTDEn										X						1	460
		OutAnMod1FltActn								X	X							2	466
								X	X	OutAnMod1IdlActn								2	467
				X	X	X	X			OutAnMod1Type								4	464
		X	X							Reserved								2	1101
168	84									InAMod2C0TripDly								8	474
		InAMod2C1TripDly																8	483
169										InAMod2C2TripDly								8	492
		Reserved																8	1102
170	85	InAMod2C0TripLvl																16	475
171		InAMod2C0WarnLvl																16	476
172	86	InAMod2C1TripLvl																16	484
173		InAMod2C1WarnLvl																16	485
174	87	InAMod2C2TripLvl																16	493
175		InAMod2C2WarnLvl																16	494

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
176	88												InAnMod2Ch00Type					5	468
								InAnMod2Ch01Type										5	477
			InAnMod2Ch02Type															5	486
		X	Reserved															1	1101
177										OutAnMod2Select								8	496
							X	X	X	InAMod2Ch0Format								3	469
				X	X	X				InAMod2C0FiltFrq								3	471
		X	X							InAMod2C0OpCktSt								2	472
178	89	InAMod2Ch1Format													X	X	X	3	478
		InAMod2C1FiltFrq										X	X	X				3	480
		InAMod2C1OpCktSt								X	X							2	481
							X	X	X	InAMod2Ch2Format								3	487
				X	X	X				InAMod2C2FiltFrq								3	489
		X	X							InAMod2C2OpCktSt								2	490
179		InAMod2C0TmpUnit															X	1	470
		InAnMod2Ch0RTDEn														X		1	473
		InAMod2C1TmpUnit													X			1	479
		InAnMod2Ch1RTDEn												X				1	482
		InAMod2C2TmpUnit											X					1	488
		InAnMod2Ch2RTDEn										X						1	491
		OutAnMod2FltActn								X	X							2	497
								X	X	OutAnMod2dlActn								2	498
				X	X	X	X			OutAnMod2Type								4	495
		X	X							Reserved								2	1101
180	90									InAMod3C0TripDly								8	505
		InAMod3C1TripDly																8	514
181										InAMod3C2TripDly								8	523
		Reserved																8	1102
182	91	InAMod3C0TripLvl																16	506
183		InAMod3C0WarnLvl																16	507
184	92	InAMod3C1TripLvl																16	515
185		InAMod3C1WarnLvl																16	516
186	93	InAMod3C2TripLvl																16	524
187		InAMod3C2WarnLvl																16	525
188	94												InAnMod3Ch00Type					5	499
								InAnMod3Ch01Type										5	508
			InAnMod3Ch02Type															5	517
		X	Reserved															1	NA
189										OutAnMod3Select								8	527
							X	X	X	InAMod3Ch0Format								3	500
				X	X	X				InAMod3C0FiltFrq								3	502
		X	X							InAMod3C0OpCktSt								2	503

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
190	95	InAMod3Ch1Format													X	X	X	3	509
		InAMod3C1FiltFrq										X	X	X				3	511
		InAMod3C1OpCktSt								X	X							2	512
							X	X	X	InAMod3Ch2Format								3	518
				X	X	X				InAMod3C2FiltFrq								3	520
		X	X							InAMod3C2OpCktSt								2	521
191		InAMod3C0TmpUnit															X	1	501
		InAnMod3Ch0RTDEn														X		1	504
		InAMod3C1TmpUnit													X			1	510
		InAnMod3Ch1RTDEn												X				1	513
		InAMod3C2TmpUnit											X					1	519
		InAnMod3Ch2RTDEn										X						1	522
		OutAnMod3FltActn								X	X							2	528
								X	X	OutAnMod3dlActn								2	529
				X	X	X	X			OutAnMod3Type								4	526
		X	X							Reserved								2	1101
192	96									InAMod4C0TripDly								8	536
		InAMod4C1TripDly																8	545
CEP9										InAMod4C2TripDly								8	554
		Reserved																8	1102
194	97	InAMod4C0TripLvl																16	537
195		InAMod4C0WarnLvl																16	538
196	98	InAMod4C1TripLvl																16	546
197		InAMod4C1WarnLvl																16	547
198	99	InAMod4C2TripLvl																16	555
199		InAMod4C2WarnLvl																16	556
200	100												InAnMod4Ch00Type					5	530
								InAnMod4Ch01Type										5	539
			InAnMod4Ch02Type															5	548
		X	Reserved															1	1101
201										OutAnMod4Select								8	558
							X	X	X	InAMod4Ch0Format								3	531
				X	X	X				InAMod4C0FiltFrq								3	533
		X	X							InAMod4C0OpCktSt								2	534
202	101	InAMod4Ch1Format													X	X	X	3	540
		InAMod4C1FiltFrq										X	X	X				3	542
		InAMod4C1OpCktSt								X	X							2	543
							X	X	X	InAMod4Ch2Format								3	549
				X	X	X				InAMod4C2FiltFrq								3	551
		X	X							InAMod4C2OpCktSt								2	552
203		InAMod3C0TmpUnit															X	1	532
		InAnMod4Ch0RTDEn														X		1	535
		InAMod4C1TmpUnit													X			1	541
		InAnMod4Ch1RTDEn												X				1	544
		InAMod4C2TmpUnit											X					1	550
		InAnMod4Ch2RTDEn										X						1	553
		OutAnMod4FltActn								X	X							2	559
								X	X	OutAnMod4dlActn								2	560
				X	X	X	X			OutAnMod4Type								4	557
		X	X							Reserved								2	1001

Instance 120 - Configuration Assembly Revision 1

The following table shows Attribute 3 Format and Attribute 2 Member List for revision 1 of the assembly. This is a stripped down simple version of a config assembly.

Table 372 - Instance 120 — Configuration Assembly

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
0	0	ConfigAssyRev = 1								Reserved								16	1002
1		Reserved																16	NA
2	1	FLASetting																32	171
3																			
4	3									TripClass								8	172
									X	OLPTCResetMode								1	173
								X		SingleOrThreePh								1	176
		X	X	X	X	X	X			Reserved								6	NA
5										OLResetLevel								8	174
		OLWarningLevel																8	175

Instance 144 – Default Consumed Assembly

Table 373 - Instance 144 – Default Consumed Assembly

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Path
0	0	OutputStatus0																16	Param18
1		NetworkStart1															X		Symbolic
		NetworkStart2														X			Symbolic
		TripReset													X				Symbolic
		EmergencyStart												X					Symbolic
		RemoteTrip											X						Symbolic
		Reserved								X	X	X							NA
									X	HMILED1Green									Symbolic
								X		HMILED2Green									Symbolic
							X			HMILED3Green									Symbolic
						X				HMILED3Red									Symbolic
					X					HMILED4Red									Symbolic
		X	X	X						Reserved									NA
2	1	DLXPtDeviceIn																16	Symbolic
3		DLXAnDeviceIn																16	Symbolic

Instance 198 - Current Diagnostics Produced Assembly

Table 374 - Instance 198 – Current Diagnostics Produced Assembly

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
0	0	Reserved for Logix																32	1104
1																			
2	1	DeviceStaus0																16	20
3		DeviceStaus1																16	21

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
4	2	InputStatus0																16	16
5		InputStatus1																16	17
6	3	OutputStatus																16	18
7		OpStationStatus																16	19
8	4	TripStsCurrent																16	4
9		WarnStsCurrent																16	10
10	5	TripStsVoltage																16	5
11		WarnStsVoltage																16	11
12	6	TripStsPower																16	6
13		WarnStsPower																16	12
14	7	TripStsControl																16	7
15		WarnStsControl																16	13
16	8	TripStsAnalog																16	8
17		WarnStsAnalog																16	14
18	9	Reserved																16	1103
19		MismatchStatus																16	40
20	10									ThermUtilizedPct								8	1
		CurrentImbal																8	52
21		AvgPercentFLA																16	50
22 23	11	AverageCurrent																32	46
24 25	12	L1Current																32	43
26 27	13	L2Current																32	44
28 29	14	L3Current																32	45
30	15	GFCurrent																16	51
31		Reserved																16	1103
32 33	16	Datalink1																32	1291
34 35	17	Datalink2																32	1292
36 37	18	Datalink3																32	1293
38 39	19	Datalink4																32	1294
40 41	20	Datalink5																32	1295
42 43	21	Datalink6																32	1296
44 45	22	Datalink7																32	1297
46 47	23	Datalink8																32	1298
48	24	PtDeviceOuts																16	348
49		AnDeviceOuts																16	1105
50	25	InAnMod1Ch00																16	111
51		InAnMod1Ch01																16	112

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
52	26	InAnMod1Ch02																16	113
53		Reserved																16	1103
54	27	InAnMod2Ch00																16	114
55		InAnMod2Ch01																16	115
56	28	InAnMod2Ch02																16	116
57		Reserved																16	1103
58	29	InAnMod3Ch00																16	117
59		InAnMod3Ch01																16	118
60	30	InAnMod3Ch02																16	119
61		Reserved																16	1103
62	31	InAnMod4Ch00																16	120
63		InAnMod4Ch01																16	121
64	32	InAnMod4Ch02																16	122
65		Reserved																16	1103

Instance 199 - All Diagnostics Produced Assembly

Table 375 - Instance 199 - All Diagnostics Produced Assembly

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
0	0	Reserved for Logix																32	1104
1																			
2	1	DeviceStaus0																16	20
3		DeviceStaus1																16	21
4	2	InputStatus0																16	16
5		InputStatus1																16	17
6	3	OutputStatus																16	18
7		OpStationStatus																16	19
8	4	TripStsCurrent																16	4
9		WarnStsCurrent																16	10
10	5	TripStsVoltage																16	5
11		WarnStsVoltage																16	11
12	6	TripStsPower																16	6
13		WarnStsPower																16	12
14	7	TripStsControl																16	7
15		WarnStsControl																16	13
16	8	TripStsAnalog																16	8
17		WarnStsAnalog																16	14
18	9	Reserved																16	1104
19																		16	40
20	10									ThermUtilizedPct								8	1
		CurrentImbalance																8	52
21		AvgPercentFLA																16	50
22	11	AverageCurrent																32	46
23																			
24	12	L1Current																32	43
25																			
26	13	L2Current																32	44
27																			

INT	DINT	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Size (bits)	Param
28 29	14	L3Current																32	45
30	15	GFCurrent																16	51
31		Reserved																16	1103
32	16	AvgVoltageLtoL																16	56
33		L1toL2Voltage																16	53
34	17	L2toL3Voltage																16	54
35		L3toL1Voltage																16	55
36 37	18	TotalRealPower																32	67
38 39	19	TotalReactivePwr																32	71
40 41	20	TotalApparentPwr																32	75
42 43	21	TotalPowerFactor																32	79
44 45	22	Datalink0																32	1291
46 47	23	Datalink1																32	1292
48 49	24	Datalink2																32	1293
50 51	25	Datalink3																32	1294
52 53	26	Datalink4																32	1295
54 55	27	Datalink5																32	1296
56 57	28	Datalink6																32	1297
58 59	29	Datalink7																32	1298
60	30	PtDeviceOuts																16	348
61		AnDeviceOuts																16	1105
62	31	InAnMod1Ch00																16	111
63		InAnMod1Ch01																16	112
64	32	InAnMod1Ch02																16	113
65		Reserved																16	1103
66	33	InAnMod2Ch00																16	114
67		InAnMod2Ch01																16	115
68	34	InAnMod2Ch02																16	116
69		Reserved																16	1103
70	35	InAnMod3Ch00																16	117
71		InAnMod3Ch01																16	118
72	36	InAnMod3Ch02																16	119
73		Reserved																16	1103
74	37	InAnMod4Ch00																16	120
75		InAnMod4Ch01																16	121
76	38	InAnMod4Ch02																16	122
77		Reserved																16	1103

Connection Object — CLASS CODE 0x0005

No class attributes are supported for the Connection Object

Multiple instances of the Connection Object are supported, instances 1, 2 and 4 from the group 2 predefined master/slave connection set, and instances 5-7 are available explicit UCMM connections.

Instance 1 is the Predefined Group 2 Connection Set Explicit Message Connection. The following instance 1 attributes are supported:

Table 376 - Connection Object — CLASS CODE 0x0005 Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0=nonexistant 1=configuring 3=established 4=timed out
2	Get	Instance Type	USINT	0=Explicit Message
3	Get	Transport Class Trigger	USINT	0x83 - Server, Transport Class 3
4	Get	Produced Connection ID	UINT	10xxxxxx011 xxxxxx = node address
5	Get	Consumed Connection ID	UINT	10xxxxxx100 xxxxxx = node address
6	Get	Initial Comm Characteristics	USINT	0x22
7	Get	Produced Connection Size	UINT	0x61
8	Get	Consumed Connection Size	UINT	0x61
9	Get/Set	Expected Packet Rate	UINT	in milliseconds
12	Get	Watchdog Action	USINT	01 = auto delete 03 = deferred delete
13	Get	Produced Connection Path Length	UINT	0
14	Get	Produced Connection Path		Empty
15	Get	Consumed Connection Path Length	UINT	0
16	Get	Consumed Connection Path		Empty

Instance 2 is the Predefined Group 2 Connection Set Polled IO Message Connection. The following instance 2 attributes are supported:

Table 377 - Connection Object — CLASS CODE 0x0005 Instance 2 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0=nonexistant 1=configuring 3=established 4=timed out
2	Get	Instance Type	USINT	1= I/O Connection
3	Get	Transport Class Trigger	USINT	0x82 - Server, Transport Class 2 (If alloc_choice != polled and ack suppression is enabled then value = 0x80)
4	Get	Produced Connection ID	UINT	01111xxxxxx xxxxxx= node address
5	Get	Consumed Connection ID	UINT	10xxxxxx101 xxxxxx= node address
6	Get	Initial Comm Characteristics	USINT	0x21
7	Get	Produced Connection Size	UINT	0 to 8
8	Get	Consumed Connection Size	UINT	0 to 8
9	Get/Set	Expected Packet Rate	UINT	in milliseconds
12	Get/Set	Watchdog Action	USINT	0=transition to timed out 1=auto delete 2=auto reset
13	Get	Produced Connection Path Length	UINT	8
14	Get/Set	Produced Connection Path		21 04 00 25 (assy inst) 00 30 03
15	Get	Consumed Connection Path Length	UINT	8
16	Get/Set	Consumed Connection Path		21 04 00 25 (assy inst) 00 30 03

Instance 4 is the Predefined Group 2 Connection Set Change of State / Cyclic I/O Message Connection. The following instance 4 attributes are supported:

Table 378 - Connection Object — CLASS CODE 0x0005 Instance 4 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0=nonexistant 1=configuring 3=established 4=timed out
2	Get	Instance Type	USINT	1=I/O Connection
3	Get	Transport Class Trigger	USINT	0x00 (Cyclic, unacknowledged) 0x03 (Cyclic, acknowledged) 0x10 (COS, unacknowledged) 0x13 (COS, acknowledged)
4	Get	Produced Connection ID	UINT	01101xxxxxx xxxxxx= node address
5	Get	Consumed Connection ID	UINT	10xxxxxx101 xxxxxx= node address
6	Get	Initial Comm Characteristics	USINT	0x02 (acknowledged) 0x0F (unacknowledged)
7	Get	Produced Connection Size	UINT	0 to 8
8	Get	Consumed Connection Size	UINT	0 to 8
9	Get/Set	Expected Packet Rate	UINT	in milliseconds
12	Get	Watchdog Action	USINT	0=transition to timed out 1=auto delete 2=auto reset
13	Get	Produced Connection Path Length	UINT	8
14	Get	Produced Connection Path		21 04 00 25 (assy inst) 00 30 03
15	Get	Consumed Connection Path Length	UINT	8
16	Get/Set	Consumed Connection Path		21 04 00 25 (assy inst) 00 30 03

Instances 5 - 7 are available group 3 explicit message connections that are allocated through the UCMM. The following attributes are supported:

Table 379 - Connection Object — CLASS CODE 0x0005 Instance 5…7 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0=nonexistant 1=configuring 3=established 4=timed out
2	Get	Instance Type	USINT	0=Explicit Message
3	Get	Transport Class Trigger	USINT	0x83 - Server, Transport Class 3
4	Get	Produced Connection ID	UINT	Depends on message group and Message ID
5	Get	Consumed Connection ID	UINT	Depends on message group and Message ID
6	Get	Initial Comm Characteristics	USINT	0x33 (Group 3)
7	Get	Produced Connection Size	UINT	0
8	Get	Consumed Connection Size	UINT	
9	Get/Set	Expected Packet Rate	UINT	in milliseconds
12	Get	Watchdog Action	USINT	01 = auto delete 03 = deferred delete
13	Get	Produced Connection Path Length	UINT	0
14	Get	Produced Connection Path		Empty
15	Get	Consumed Connection Path Length	UINT	0
16	Get	Consumed Connection Path		Empty

The following services are implemented for the Connection Object.

Table 380 - Connection Object Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x05	No	Yes	Reset
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Discrete Input Point Object — CLASS CODE 0x0008

The following class attributes are supported for the Discrete Input Point Object:

Table 381 - Discrete Input Point Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	2
2	Get	Max. Instance	UINT	22

22 instances of the Discrete Input Point Object are supported.

Table 382 - Discrete Input Point Object Instances

Instance	Name	Description
1	InputPt00	Control Module Input 0
2	InputPt01	Control Module Input 1
3	InputPt02	Control Module Input 2
4	InputPt03	Control Module Input 3
5	InputPt04	Control Module Input 4
6	InputPt05	Control Module Input 5
7	InputDigMod1Pt00	Digital Expansion Module 1 Input 0
8	InputDigMod1Pt01	Digital Expansion Module 1 Input 1
9	InputDigMod1Pt02	Digital Expansion Module 1 Input 2
10	InputDigMod1Pt03	Digital Expansion Module 1 Input 3
11	InputDigMod2Pt00	Digital Expansion Module 2 Input 0
12	InputDigMod2Pt01	Digital Expansion Module 2 Input 1
13	InputDigMod2Pt02	Digital Expansion Module 2 Input 2
14	InputDigMod2Pt03	Digital Expansion Module 2 Input 3
15	InputDigMod3Pt00	Digital Expansion Module 3 Input 0
16	InputDigMod3Pt01	Digital Expansion Module 3 Input 1
17	InputDigMod3Pt02	Digital Expansion Module 3 Input 2
18	InputDigMod3Pt03	Digital Expansion Module 3 Input 3
19	InputDigMod4Pt00	Digital Expansion Module 4 Input 0
20	InputDigMod4Pt01	Digital Expansion Module 4 Input 1
21	InputDigMod4Pt02	Digital Expansion Module 4 Input 2
22	InputDigMod4Pt03	Digital Expansion Module 4 Input 3

All instances contain the following attributes.

Table 383 - Discrete Input Point Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
3	Get	Value	BOOL	0=OFF, 1=ON
115	Get/Set	Force Enable	BOOL	0=Disable, 1=Enable
116	Get/Set	Force Value	BOOL	0=OFF, 1=ON

The following common services are implemented for the Discrete Input Point Object.

Table 384 - Discrete Input Point Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Discrete Output Point Object — CLASS CODE 0x0009

The following class attributes are supported for the Discrete Output Point Object:

Table 385 - Discrete Output Point Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max. Instance	UINT	11

11 instances of the Discrete Output Point Object are supported.

Table 386 - Discrete Output Point Object Instances

Instance	Name	Description
1	OutputPt00	Control Module Output 0
2	OutputPt01	Control Module Output 1
3	OutputPt02	Control Module Output 2
4	OutDigMod1Pt00	Digital Expansion Module 1 Output 0
5	OutDigMod1Pt01	Digital Expansion Module 1 Output 1
6	OutDigMod2Pt00	Digital Expansion Module 2 Output 0
7	OutDigMod2Pt01	Digital Expansion Module 2 Output 1
8	OutDigMod3Pt00	Digital Expansion Module 3 Output 0
9	OutDigMod3Pt01	Digital Expansion Module 3 Output 1
10	OutDigMod4Pt00	Digital Expansion Module 4 Output 0
11	OutDigMod4Pt01	Digital Expansion Module 4 Output 1

All instances contains the following attributes.

Table 387 - Discrete Output Point Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
3	Get	Value	BOOL	0=OFF, 1=ON
5	Get/Set	Fault Action	BOOL	0=Fault Value attribute, 1=Hold Last State
6	Get/Set	Fault Value	BOOL	0=OFF, 1=ON
7	Get/Set	Idle Action	BOOL	0=Fault Value attribute, 1=Hold Last State
8	Get/Set	Idle Value	BOOL	0=OFF, 1=ON
113	Get/Set	Pr Fault Action	BOOL	0=Pr Fault Value attribute, 1=Ignore
114	Get/Set	Pr Fault Value	BOOL	0=OFF, 1=ON
115	Get/Set	Force Enable	BOOL	0=Disable, 1=Enable
116	Get/Set	Force Value	BOOL	0=OFF, 1=ON
117	Get/Set	Input Binding	STRUCT: USINT Array of USINT	Size of appendix I encoded path Appendix I encoded path: NULL path means attribute 3 drives the output. Otherwise, this is a path to a bit in an instance of the DeviceLogix Data Table.

The following common services are implemented for the Discrete Output Point Object.

Table 388 - Discrete Output Point Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Analog Input Point Object — CLASS CODE 0x000A

The following class attributes are supported for the Analog Input Point Object:

Table 389 - Analog Input Point Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	2
2	Get	Max. Instance	UINT	1

12 Instances of the Analog Input Point Object are supported. The raw analog value is scaled appropriately to the analog input configuration parameters and the scaled value are placed in the Value attribute.

Table 390 - Analog Input Point Object Instances

Instance	Name	Description
1	InAnMod1Ch00	Analog Expansion Module 1 Input Channel 0
2	InAnMod1Ch01	Analog Expansion Module 1 Input Channel 1
3	InAnMod1Ch02	Analog Expansion Module 1 Input Channel 2
4	InAnMod2Ch00	Analog Expansion Module 2 Input Channel 0
5	InAnMod2Ch01	Analog Expansion Module 2 Input Channel 1
6	InAnMod2Ch02	Analog Expansion Module 2 Input Channel 2
7	InAnMod3Ch00	Analog Expansion Module 3 Input Channel 0
8	InAnMod3Ch01	Analog Expansion Module 3 Input Channel 1
9	InAnMod3Ch02	Analog Expansion Module 3 Input Channel 2
10	InAnMod4Ch00	Analog Expansion Module 4 Input Channel 0
11	InAnMod4Ch01	Analog Expansion Module 4 Input Channel 1
12	InAnMod4Ch02	Analog Expansion Module 4 Input Channel 2

All instances contains the following attributes.

Table 391 - Analog Input Point Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
3	Get	Value	INT	Default = 0
8	Get	Value Data Type	USINT	0=INT
148	Get/Set	Force Enable	BOOL	0=Disable, 1=Enable
149	Get/Set	Force Value	INT	Default = 0

The following common services are implemented for the Analog Input Point Object.

Table 392 - Analog Input Point Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Analog Output Point Object — CLASS CODE 0x000B

Table 393 - Analog Output Point Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	2
2	Get	Max. Instance	UINT	1

4 Instances of the Analog Output Point Object are supported. The Value Attribute can then be overwritten by DeviceLogix.

Table 394 - Analog Output Point Object Instances

Instance	Name	Description
1	OutAnMod1Ch00	Analog Expansion Module 1 Output Channel 0
2	OutAnMod2Ch00	Analog Expansion Module 2 Output Channel 0
3	OutAnMod3Ch00	Analog Expansion Module 3 Output Channel 0
4	OutAnMod4Ch00	Analog Expansion Module 4 Output Channel 0

All instances contains the following attributes.

Table 395 - Analog Output Point Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
3	Get/Set	Value	INT	Default = 0
8	Get	Value Data Type	USINT	0=INT
9	Get/Set	Fault Action	USINT	0=Hold Last State 1=Low Limit 2=High Limit 3=Zero
10	Get/Set	Idle Action	USINT	0=Hold Last State 1=Low Limit 2=High Limit 3=Zero
129	Get/Set	Input Binding	STRUCT: USINT Array of USINT	Size of appendix I encoded path Appendix I encoded path: NULL path means attribute 3 drives the output. Otherwise, this is a path to a bit in the Bit Table.
130	Get/Set	Force Enable	BOOL	0=Disable, 1=Enable
131	Get/Set	Force Value	INT	Default = 0

The following common services are implemented for the Analog Output Point Object.

Table 396 - Analog Output Point Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Parameter Object — CLASS CODE 0x000F

The following class attributes are supported for the Parameter Object:

Table 397 - Parameter Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	560
8	Get	Parameter Class Descriptor	WORD	0x03
9	Get	Configuration Assembly Instance	UINT	0
10	Get	Native Language	UINT	1 = English

The following instance attributes are implemented for all parameter attributes.

Table 398 - Parameter Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get/Set	Value	Specified in Descriptor	
2	Get	Link Path Size	USINT	08
3	Get	Link Path	Array of: BYTE EPATH	Path to specified object attribute.
4	Get	Descriptor	WORD	Parameter Dependent
5	Get	Data Type	EPATH	Parameter Dependent
6	Get	Data Size	USINT	Parameter Dependent
7	Get	Parameter Name String	SHORT_STRING	Parameter Dependent
8	Get	Units String	SHORT_STRING	Parameter Dependent
9	Get	Help String	SHORT_STRING	Parameter Dependent
10	Get	Minimum Value	Specified in Descriptor	Parameter Dependent
11	Get	Maximum Value	Specified in Descriptor	Parameter Dependent
12	Get	Default Value	Specified in Descriptor	Parameter Dependent
13	Get	Scaling Multiplier	UINT	01
14	Get	Scaling Divisor	UINT	01
15	Get	Scaling Base	UINT	01
16	Get	Scaling Offset	INT	00
17	Get	Multiplier Link	UINT	0
18	Get	Divisor Link	UINT	0
19	Get	Base Link	UINT	0
20	Get	Offset Link	UINT	0
21	Get	Decimal Precision	USINT	Parameter Dependent

The following common services are implemented for the Parameter Object.

Table 399 - Parameter Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Parameter Group Object — CLASS CODE 0x0010

The following class attributes are supported for the Parameter Object:

Table 400 - Parameter Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	23
8	Get	Native Language	USINT	1 = English

The following instance attributes are supported for all parameter group instances:

The following instance attributes are implemented for all parameter attributes.

Table 401 - Parameter Group Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Group Name String	SHORT_STRING	
2	Get	Number of Members	UINT	
3	Get	1st Parameter	UINT	
4	Get	2nd Parameter	UINT	
n	Get	Nth Parameter	UINT	

The following common services are implemented for the Parameter Group Object.

Table 402 - Parameter Group Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single

Discrete Output Group Object — CLASS CODE 0x001E

No class attributes are supported for the Discrete Output Group Object.

Five instances of the Discrete Output Group Object are supported.

Instance 1 has the following instances:

Table 403 - Discrete Output Group Object Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
3	Get	Number of Instances	USINT	11
4	Get	Binding	Array of UINT	1,2,3,4,5,6,7,8,9,10,11
6	Get/Set	Command	BOOL	0=idle; 1=run
104	Get/Set	Network Status Override	BOOL	0=No Override (go to safe state) 1=Override (run local logic)
105	Get/Set	Comm Status Override	BOOL	0=No override (go to safe state) 1=Override (run local logic)

Instances 2-5 each represent a single expansion module. They have the following attributes.

Table 404 - Discrete Output Group Object Instance 2…5 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
3	Get	Number of Instances	USINT	2
4	Get	Binding	Array of UINT	Instance 2: 4, 5 Instance 3: 6, 7 Instance 4: 8, 9 Instance 5: 10, 11
6	Get/Set	Command	BOOL	0=idle; 1=run
7	Get/Set	Fault Action	BOOL	0=Fault Value Attribute, 1=Hold Last State
8	Get/Set	Fault Value	BOOL	0=OFF, 1=ON
9	Get/Set	Idle Action	BOOL	0=Idle Value Attribute, 1=Hold Last State
10	Get/Set	Idle Value	BOOL	0=OFF, 1=ON
113	Get/Set	Pr Fault Action	BOOL	0=Pr Fault Value Attribute, 1=Ignore
114	Get/Set	Pr Fault Value	BOOL	0=OFF, 1=ON

The following common services are implemented for the Discrete Output Group Object.

Table 405 - Discrete Output Group Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Control Supervisor Object — CLASS CODE 0x0029

No class attributes are supported.

A single instance (instance 1) of the Control Supervisor Object is supported.

Table 406 - Control Supervisor Object Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
10	Get	Tripped	BOOL	0 = No Fault present 1 = Fault Latched
11	Get	Warning	BOOL	0 = No Warning present 1 = Warning present (not latched)
12	Get/Set	Fault Reset	BOOL	0->1 = Trip Reset otherwise no action

The following common services are implemented for the Control Supervisor Object.

Table 407 - Control Supervisor Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Overload Object — CLASS CODE 0x002c

No class attributes are supported for the Overload Object.

A single instance (instance 1) of the Overload Object is supported.

Table 408 - Overload Object Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
4	Get/Set	Trip Class	USINT	5…30
5	Get	Average Current	INT	xxx.x Amps (tenths of amps)
6	Get	%Phase Imbal	USINT	xxx% FLA
7	Get	% Thermal Utilized	USINT	xxx% FLA
8	Get	Current L1	INT	xxx.x Amps (tenths of amps)
9	Get	Current L2	INT	xxx.x Amps (tenths of amps)
10	Get	Current L3	INT	xxx.x Amps (tenths of amps)
11	Get	GF Current	INT	0.00 – 12.75 Amps

The following common services are implemented for the Overload Object.

Table 409 - Overload Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Base Energy Object — CLASS CODE 0x004E

The following class attributes are supported for the Base Energy Object.

Table 410 - Base Energy Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Object Revision	USINT	2

A single instance of the Base Energy Object is supported

Table 411 - Base Energy Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Energy/Resource Type	UINT	1 = Electrical
2	Get	Energy Object Capabilities	WORD	0x0001 = Energy Measured
3	Get	Energy Accuracy	UINT	500 = 5.00 percent of full scale reading
4	Get	Energy Accuracy Basis	UINT	1 = Percent of full scale reading
5	Get	Full Scale Power Reading	Real	x.xxx kW (TBD)
7	Get	Consumed Energy Odometer	ODOMETER	Returns params 80-84 values.
9	Get	Total Energy Odometer	SIGNED ODOMETER	Returns params 80-84 values.
10	Get	Total Real Power	REAL	Param 67 value converted to a REAL
12	Get	Energy Type Specific Object Path	STRUCT of UINT Padded EPATH	03 00 21 00 4F 00 24 01
16	Set	Odometer Reset Enable	BOOL	0 = Disabled (Default) 1 = Enabled Enables resetting of Energy Odometers by Reset service

The following services are implemented for the Base Energy Object.

Table 412 - Base Energy Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x01	No	Yes	GetAttributes_All
0x05	No	Yes	Reset
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

The following table describes the Get_Attributes_All response.

Table 413 - Base Energy Object Class Attributes Get_Attributes_All Response

Attribute ID	Data Type	Name	Value
1	UINT	Energy/Resource Type	Attribute 1 value
2	WORD	Energy Object Capabilities	Attribute 2 value
3	UINT	Energy Accuracy	Attribute 3 value
4	UINT	Energy Accuracy Basis	Attribute 4 value
5	REAL	Full Scale Reading	Attribute 5 value
6	UINT	Data Status	0
7	ODOMETER	Consumed Energy Odometer	0Attribute 7 value
8	ODOMETER	Generated Energy Odometer	0,0,0,0,0
9	SIGNED ODOMETER	Total Energy Odometer	Attribute 9 value
10	REAL	Energy Transfer Rate	Attribute 10 value

Attribute ID	Data Type	Name	Value
11	REAL	Energy Transfer Rate User Setting	0.0
12	STRUCT of UINT, Padded EPATH [1]	Energy Type Specific Object Path	Attribute 12 value
13	UINT	Energy Aggregation Path Array Size	0
14	Array of STRUCT of UINT, Padded EPATH [1]	Energy Aggregation Paths	Null
15	STRINGI	Energy Identifier	LanguageChar1 USINT ='e' LanguageChar2 USINT)='n' LanguageChar3 USINT) ='g' CharStringStruct USINT=0xD0 CharSet UINT = 0 = undefined InternationalString = null
16	BOOL	Odometer Reset Enable	Attribute 16 value
17	BOOL	Metering State	1

Electrical Energy Object — CLASS CODE 0x004F

No class attributes are supported for the Electrical Energy Object.

A single instance of the Electrical Energy Object is supported

Table 414 - Electrical Energy Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Real Energy Consumed Odometer	ODOMETER	Returns params 80-84 values.
3	Get	Real Energy Net Odometer	SIGNED ODOMEETER	Returns params 80-84 values.
4	Get	Reactive Energy Consumed Odometer	ODOMETER	Returns params 85-89 values.
5	Get	Reactive Energy Generated Odometer	ODOMETER	Returns params 90-94 values.
6	Get	Reactive Energy Net Odometer	SIGNED ODOMETER	Returns params 95-99 values.
7	Get	Apparent Energy Odometer	ODOMETER	Returns params 100-104 values.
9	Get	Line Frequency	REAL	Param 62 value converted to a REAL
10	Get	L1 Current	REAL	Param 43 value converted to a REAL
11	Get	L2 Current	REAL	Param 44 value converted to a REAL
12	Get	L3 Current	REAL	Param 45 value converted to a REAL
13	Get	Average Current	REAL	Param 46 value converted to a REAL
14	Get	Percent Current Unbalance	REAL	Param 52 value converted to a REAL
15	Get	L1 to N Voltage	REAL	Param 57 value converted to a REAL
16	Get	L2 to N Voltage	REAL	Param 58 value converted to a REAL
17	Get	L3 to N Voltage	REAL	Param 59 value converted to a REAL
18	Get	Avg Voltage L to N	REAL	Param 60 value converted to a REAL
19	Get	L1 to L2 Voltage	REAL	Param 53 value converted to a REAL
20	Get	L2 to L3 Voltage	REAL	Param 54 value converted to a REAL
21	Get	L3 to L1 Voltage	REAL	Param 55 value converted to a REAL
22	Get	Avg Voltage Lto N	REAL	Param 56 value converted to a REAL

Attribute ID	Access Rule	Name	Data Type	Value
23	Get	Percent Voltage Unbalance	REAL	Param 61 value converted to a REAL
24	Get	L1 Real Power	REAL	Param 64 value converted to a REAL
25	Get	L2 Real Power	REAL	Param 65 value converted to a REAL
26	Get	L3 Real Power	REAL	Param 66 value converted to a REAL
27	Get	Total Real Power	REAL	Param 67 value converted to a REAL
28	Get	L1 Reactive Power	REAL	Param 68 value converted to a REAL
29	Get	L2 Reactive Power	REAL	Param 68 value converted to a REAL
30	Get	L3 Reactive Power	REAL	Param 70 value converted to a REAL
31	Get	Total Reactive Power	REAL	Param 71 value converted to a REAL
32	Get	L1 Apparent Power	REAL	Param 72 value converted to a REAL
33	Get	L2 Apparent Power	REAL	Param 73 value converted to a REAL
34	Get	L3 Apparent Power	REAL	Param 74 value converted to a REAL
35	Get	Total Apparent Power	REAL	Param 75 value converted to a REAL
36	Get	L1 True Power Factor	REAL	Param 76 value converted to a REAL
37	Get	L2 True Power Factor	REAL	Param 77 value converted to a REAL
38	Get	L3 True Power Factor	REAL	Param 78 value converted to a REAL
39	Get	Three Phase True Power Factor	REAL	Param 79 value converted to a REAL
40	Get	Phase Rotation	UINT	Param 63 value
41	Get	Associated Energy Object Path	STRUCT of UINT Padded EPATH	03 00 21 00 4E 00 24 01

The following services are implemented for the Electrical Energy Object.

Table 415 - Electrical Energy Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x01	No	Yes	GetAttributes_All
0x0E	No	Yes	Get_Attribute_Single

The following table describes the Get_Attributes_All response.

Table 416 - Electrical Energy Object Class Attributes Get_Attributes_All Response

Attribute ID	Data Type	Name	Value
1	Array[5] of INT	Real Energy Consumed Odometer	Attribute 1 Value
2	Array[5] of INT	Real Energy Generated Odometer	0.0.0.0.0
3	Array[5] of INT	Real Energy Net Odometer	Attribute 3 Value
4	Array[5] of INT	Reactive Energy Consumed Odometer	Attribute 4 Value
5	Array[5] of INT	Reactive Energy Generated Odometer	Attribute 5 Value
6	Array[5] of INT	Reactive Energy Net Odometer	Attribute 6 Value
7	Array[5] of INT	Apparent Energy Odometer	Attribute 7 Value
8	Array[5] of INT		0.0.0.0.0
9	REAL	Line Frequency	Attribute 9 Value
10	REAL	L1 Current	Attribute 10 Value
11	REAL	L2 Current	Attribute 11 Value
12	REAL	L3 Current	Attribute 12 Value
13	REAL	Average Current	Attribute 13 Value
14	REAL	Percent Current Unbalance	Attribute 14 Value

Attribute ID	Data Type	Name	Value
15	REAL	L1 to N Voltage	Attribute 15 Value
16	REAL	L2 to N Voltage	Attribute 16 Value
17	REAL	L3 to N Voltage	Attribute 17 Value
18	REAL	Avg Voltage L to N	Attribute 18 Value
19	REAL	L1 to L2 Voltage	Attribute 19 Value
20	REAL	L2 to L3 Voltage	Attribute 20 Value
21	REAL	L3 to L1 Voltage	Attribute 21 Value
22	REAL	Avg Voltage Lto N	Attribute 22 Value
23	REAL	Percent Voltage Unbalance	Attribute 23 Value
24	REAL	L1 Real Power	Attribute 24 Value
25	REAL	L2 Real Power	Attribute 25 Value
26	REAL	L3 Real Power	Attribute 26 Value
27	REAL	Total Real Power	Attribute 27 Value
28	REAL	L1 Reactive Power	Attribute 28 Value
29	REAL	L2 Reactive Power	Attribute 29 Value
30	REAL	L3 Reactive Power	Attribute 30 Value
31	REAL	Total Reactive Power	Attribute 31 Value
32	REAL	L1 Apparent Power	Attribute 32 Value
33	REAL	L2 Apparent Power	Attribute 33 Value
34	REAL	L3 Apparent Power	Attribute 34 Value
35	REAL	Total Apparent Power	Attribute 35 Value
36	REAL	L1 True Power Factor	Attribute 36 Value
37	REAL	L2 True Power Factor	Attribute 37 Value
38	REAL	L3 True Power Factor	Attribute 38 Value
39	REAL	Three Phase True Power Factor	Attribute 39 Value
40	UINT	Phase Rotation	Attribute 40 Value
41	STRUCT of UINT Padded EPATH	Associated Energy Object Path	Attribute 41 Value

Wall Clock Time Object — CLASS CODE 0x008B

The following class attributes are supported:

Table 417 - Wall Clock Time Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Object Revision	UINT	3
2	Get	Number of Instances	UINT	1

One instance is supported:

Table 418 - Wall Clock Time Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
2	Set	Time Zone	UINT	Time zone in which Current value is being used (Never been used)
3	Set / SSV	Offset from CSV	LINT	64-bit offset value in µS that when added to the CST value yields the Current_UTC_Value
4	Set	Local Time Adjustment	WORD	Set of flags for specific local time adjustments (Never been used)

Attribute ID	Access Rule	Name	Data Type	Value
5	Set / SSV	Date and Time (Local Time)	DINT[7] – Array of seven DINTs	Current adjusted time in human readable format. DINT[0] – year DINT[1] – month DINT[2] – day DINT[3] – hour DINT[4] – minute DINT[5] – second DINT[6] – µsec.
6	Set / SSV	Current UT value (UTC Time)	LINT	Current value of Wall Clock Time. 64-bit µS value referenced from 0000 hrs January 1, 1970
7	Set / SSV	UTC Date and Time (UTC Time)	DINT[7] – Array of seven DINTs	Current time in human readable format. DINT[0] – year DINT[1] – month DINT[2] – day DINT[3] – hour DINT[4] – minute DINT[5] – second DINT[6] – µsec.
8	Set / SSV	Time Zone String	Struct of UDINT SINT[Length]	This string specifies the time zone where the controller is located, and ultimately the adjustment in hours and minutes applied to the UTC value to generate the local time value. TimeZoneString can be specified in the following formats: o UTC+hh:mm <location> o UTC-hh:mm <location> hh:mm portion is used internally to calculate the local time, and the <location> portion is used to describe the time zone and is optional. GMT is also accepted Length of the Data array can be from 10 to 82. Examples: UTC-05:00 Eastern Time UTC+01:00 Coordinated Universal Time
9	Set / SSV	DST Adjustment	INT	The number of minutes to be adjusted for daylight saving time
10	Set / SSV	Enable DST	USINT	It specifies if we are in daylight saving time or not. Not internally set. Needs user action.
11	Set	Current value (local time)	LINT	Adjusted Local value of Wall Clock Time. 64-bit µS value referenced from 0000 hrs January 1, 1970

The following services are implemented for the Wall Clock Time Object.

Table 419 - Wall Clock Time Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	GetAttributes_All
0x10	Yes	No	Set_Attribute_Single

DPI Fault Object — CLASS CODE 0x0097

This object provides access to fault information within the device.

The following class attributes are supported:

Table 420 - DPI Fault Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Class Revision	UINT	1
2	Get	Number of Instances	UINT	8
3	Get/Set	Fault Cmd Write	USINT	0=NOP; 1=Clear Fault; 2=Clear Flt Queue
4	Get	Fault Instance Read	UINT	The instance of the Fault Queue Entry containing information about the Fault that tripped the Device
5	Get	Fault Data list	Struct of:	
		Number of Parameter Instances	UINT	The total number of parameters instances stored when a fault occurs
		Parameter Instances	UINT [x]	An array of parameters instance numbers
6	Get	Number of Recorded Faults	UINT	The number of Faults recorded in the Fault Queue

Five instances of the DPI Fault Object are supported.

Table 421 - DPI Fault Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
0	Get	Full / All Info	Struct of:	
		Fault Code	UINT	See Fault Table below
		Fault Source	Struct of:	
		DPI Port Number	USINT	0
		Device Object Instance	USINT	0x2c
		Fault Text	BYTE[16]	See Fault Table below
		Fault Time Stamp	Struct of:	
		Timer Value	ULINT	
		Timer Descriptor	WORD	
		Help Object Instance	UINT	
		Fault Data		
1	Get	Basic Info	Struct of:	
		Fault Code	UINT	See Table 423
		Fault Source	Struct of:	
		DPI Port Number	USINT	0
		Device Object Instance	USINT	0x2C
		Fault Time Stamp	Struct of:	
		Timer Value	ULINT	
		Timer Descriptor	WORD	
3	Get	Help Text	STRING	See Table 423

The following common services are implemented for the DPI Fault Object.

Table 422 - DPI Fault Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	No	Set_Attribute_Single

The table below lists Fault Codes, Fault Text, and Fault Help Strings.

Table 423 - Fault Codes, Fault Text, and Fault Help Strings

Fault Code	Fault Text	Help Text
0	No Fault	No Fault Conditions Detected
1	OverloadTrip	Motor current overload condition
2	PhaseLossTrip	Phase current Loss detected in one of the motor phases
3	GroundFaultTrip	Power conductor or motor winding is shorting to ground
4	StallTrip	Motor has not reached full speed by the end of Stall Enable Time
5	JamTrip	Motor current has exceed the programmed jam trip level
6	UnderloadTrip	Motor current has fallen below normal operating levels
7	Current Imbal	Phase to phase current imbalance detected
8	L1UnderCurrTrip	L1Current was below L1 Undercurrent Level longer than Trip Delay
9	L2UnderCurrTrip	L2Current was below L2 Undercurrent Level longer than Trip Delay
10	L3UnderCurrTrip	L3Current was below L3 Undercurrent Level longer than Trip Delay
11	L1OverCurrenTrip	L1 Current was over L1 Overcurrent Level longer than Trip Delay
12	L2OverCurrenTrip	L2 Current was over L2 Overcurrent Level longer than Trip Delay
13	L3OverCurrenTrip	L3 Current was over L3 Overcurrent Level longer than Trip Delay
14	L1LineLossTrip	L1 Current Lost for longer than the L1 Loss Trip Delay
15	L2LineLossTrip	L2 Current Lost for longer than the L2 Loss Trip Delay
16	L3LineLossTrip	L3 Current Lost for longer than the L3 Loss Trip Delay
17	UnderVoltageTrip	Line to Line Under-Voltage condition detected
18	OverVoltageTrip	Line to Line Over-Voltage condition detected
19	VoltageUnbalTrip	Phase to phase voltage imbalance detected
20	PhaseRotationTrp	The unit detects the supply voltage phases are rotated
21	UnderFreqTrip	Line voltage frequency is below trip level
22	OverFreqTrip	Line voltage frequency has exceeded trip level
23	Fault23	
24	Fault24	
25	Fault25	
26	Fault26	
27	Fault27	
28	Fault28	
29	Fault29	
30	Fault30	
31	Fault31	
32	Fault32	
33	UnderKWTrip	Total Real Power(kW)is below trip level
34	OverKWTrip	Total Real Power(kW)has exceeded trip level
35	UnderKVARConTrip	Under Total Reactive Power Consumed (+kVAR) condition detected
36	OverKVARConTrip	Over Total Reactive Power Consumed (+kVAR) condition detected
37	UnderKVARGenTrip	Under Total Reactive Power Generated (-kVAR) condition detected
38	OverKVARGenTrip	Over Total Reactive Power Generated (-kVAR) condition detected
39	UnderKVATrip	Total Apparent Power (VA or kVA or MVA) is below trip level
40	OverKVATrip	Total Apparent Power (VA or kVA or MVA) exceeded trip level
41	UnderPFLagTrip	Under Total Power Factor Lagging (-PF) condition detected
42	OverPFLagTrip	Over Total Power Factor Lagging (-PF) condition detected
43	UnderPFLeadTrip	Under Total Power Factor Leading (+PF) condition detected
44	OverPFLeadTrip	Over Total Power Factor Leading (+PF) condition detected
45	Fault45	
46	Fault46	

Fault Code	Fault Text	Help Text
47	Fault47	
48	Fault48	
49	TestTrip	Test trip caused by holding the Test/Rest button for 2 seconds
50	PTCTrip	PTC input indicates that the motor stator windings overheated
51	DLXTrip	DeviceLogix defined trip was generated
52	OperStationTrip	The Stop button the Operator Station was pressed
53	RemoteTrip	Remote trip command detected
54	BlockedStartTrip	Maximum starts per hour exceeded
55	Trip55	Hardware configuration fault. Check for shorts on input terminal
56	ConfigTrip	Invalid parameter config. See parameters 38-39 for details
57	Trip57	
58	DLXFBTimeoutTrip	DeviceLogix Feedback Timeout Trip was detected
59	Trip59	
60	Trip60	
61	Trip61	
62	NVSTrip	NonVolatile Storage memory problem detected
63	Trip63	
64	Trip64	
65	InAnMod1Ch00Trip	Input Channel 00 on Analog Module 1 exceeded its Trip Level
66	InAnMod1Ch01Trip	Input Channel 01 on Analog Module 1 exceeded its Trip Level
67	InAnMod1Ch02Trip	Input Channel 02 on Analog Module 1 exceeded its Trip Level
68	InAnMod2Ch00Trip	Input Channel 00 on Analog Module 2 exceeded its Trip Level
69	InAnMod2Ch01Trip	Input Channel 01 on Analog Module 2 exceeded its Trip Level
70	InAnMod2Ch02Trip	Input Channel 02 on Analog Module 2 exceeded its Trip Level
71	InAnMod3Ch00Trip	Input Channel 00 on Analog Module 3 exceeded its Trip Level
72	InAnMod3Ch01Trip	Input Channel 01 on Analog Module 3 exceeded its Trip Level
73	InAnMod3Ch02Trip	Input Channel 02 on Analog Module 3 exceeded its Trip Level
74	InAnMod4Ch00Trip	Input Channel 00 on Analog Module 4 exceeded its Trip Level
75	InAnMod4Ch01Trip	Input Channel 01 on Analog Module 4 exceeded its Trip Level
76	InAnMod4Ch02Trip	Input Channel 02 on Analog Module 4 exceeded its Trip Level
77	Trip77	
78	Trip78	
79	Trip79	
80	Trip80	
81	DigitalMod1Trip	Digital Expansion Module 1 is not operating properly
82	DigitalMod2Trip	Digital Expansion Module 2 is not operating properly
83	DigitalMod3Trip	Digital Expansion Module 3 is not operating properly
84	DigitalMod4Trip	Digital Expansion Module 4 is not operating properly
85	AnalogMod1Trip	Analog Expansion Module 1 is not operating properly
86	AnalogMod2Trip	Analog Expansion Module 2 is not operating properly
87	AnalogMod3Trip	Analog Expansion Module 3 is not operating properly
88	AnalogMod4Trip	Analog Expansion Module 4 is not operating properly
89	Trip89	
90	CtlModMismatch	Control Module installed does not match the expected type
91	SenseModMismatch	Sensing Module installed does not match the expected type
92	CommModMismatch	Comms Module installed does not match the expected type
93	OperStatMismatch	Operator Station installed does not match expected type
94	DigModMismatch	Digital Module installed does not match the expected type
95	AnModMismatch	Analog Module installed does not match the expected type
96	Trip96	

Fault Code	Fault Text	Help Text
97	Trip97	
98	HardwareFltTrip	A hardware fault condition was detected
99	Trip99	

DPI Warning Object — CLASS CODE 0x0098

This object provides access to warning information within the device.

The following class attributes are supported:

Table 424 - DPI Warning Object Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Class Revision	UINT	1
2	Get	Number of Instances	UINT	8
3	Get/Set	Warning Cmd Write	USINT	0=NOP 2=Clear Queue
4	Get	Warning Instance Read	UINT	The instance of the Warning Queue Entry containing information about the most recent warning
6	Get	Number of Recorded Faults	UINT	The number of Warning recorded in the Warning Queue

Four instances of the DPI Warning Object are supported.

Table 425 - DPI Warning Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
0	Get	Full / All Info	Struct of:	
		Warning Code	UINT	See Warning Table below
		Warning Source	Struct of:	
		DPI Port Number	USINT	0
		Device Object Instance	USINT	0x2c
		Warning Text	BYTE[16]	See Table 427
		Warning Time Stamp	Struct of:	
		Timer Value	ULINT	
		Timer Descriptor	WORD	
		Help Object Instance	UINT	
		Fault Data		
1	Get	Basic Info	Struct of:	
		Warning Code	UINT	See Table 427
		Warning Source	Struct of:	
		DPI Port Number	USINT	0
		Device Object Instance	USINT	0x2C
		Warning Time Stamp	Struct of:	
		Timer Value	ULINT	
		Timer Descriptor	WORD	
3	Get	Help Text	STRING	See Table 427

The following common services are implemented for the DPI Warning Object.

Table 426 - DPI Warning Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	Yes	No	Set_Attribute_Single

The table below lists Warning Codes, Warning Text, and Warning Help Strings.

Table 427 - Warning Codes, Warning Text, and Warning Help Strings

Warning Code	Warning Text	Warning Help Text
0	No Warning	No Warning Conditions Detected
1	OverloadWarning	Approaching a motor current overload condition
2	Warning2	
3	Ground Fault	Power conductor or motor winding is shorting to ground
4	Warning4	
5	JamWarning	Motor current has exceed the programmed jam warning level
6	UnderloadWarning	Motor current has fallen below normal operating levels
7	Current ImbalWarn	Phase to phase current imbalance detected
8	L1UnderCurrWarn	L1Current was below L1 Undercurrent Warning Level
9	L2UnderCurrWarn	L2Current was below L2 Undercurrent Warning Level
10	L3UnderCurrWarn	L3Current was below L3 Undercurrent Warning Level
11	L1OverCurrenWarn	L1 Current was over L1 Overcurrent Warning Level
12	L2OverCurrenWarn	L2 Current was over L2 Overcurrent Warning Level
13	L3OverCurrenWarn	L3 Current was over L3 Overcurrent Warning Level
14	L1LineLossWarn	L1 Current Lost for longer than the L1 Loss Trip Delay
15	L2LineLossWarn	L2 Current Lost for longer than the L2 Loss Trip Delay
16	L3LineLossWarn	L3 Current Lost for longer than the L3 Loss Trip Delay
17	UnderVoltageWarn	Line to Line Under-Voltage condition detected
18	OvervoltageWarn	Line to Line Over-Voltage condition detected
19	VoltageUnbalWarn	Phase to phase voltage imbalance detected
20	PhaseRotationWrn	The unit detects the supply voltage phases are rotated
21	UnderFreqWarning	Line voltage frequency is below the warning level
22	OverFreqWarning	Line voltage frequency has exceeded warning level
23	Warning23	
24	Warning24	
25	Warning25	
26	Warning26	
27	Warning27	
28	Warning28	
29	Warning29	
30	Warning30	
31	Warning31	
32	Warning32	
33	UnderKWWarning	Total Real Power (kW) is below warning level
34	OverKWWarning	Total Real Power (kW) has exceeded warning level
35	UnderKVARConWarn	Under Reactive Power Consumed (+kVAR) condition detected
36	OverKVARConWarn	Over Reactive Power Consumed (+kVAR) condition detected
37	UnderKVARGenWarn	Under Reactive Power Generated (-kVAR) condition detected

Warning Code	Warning Text	Warning Help Text
38	OverKVARGenWarn	Over Reactive Power Generated (-kVAR) condition detected
39	Under Power kVA	Total Apparent Power (kVA) is below warning level
40	Over Power kVA	Total Apparent Power (kVA) exceeded warning level
41	Under PF Lagging	Under Total Power Factor Lagging (-PF) condition detected
42	Over PF Lagging	Over Total Power Factor Lagging (-PF) condition detected
43	Under PF Leading	Under Total Power Factor Leading (+PF) condition detected
44	Over PF Leading	Over Total Power Factor Leading (+PF) condition detected
45	Warning 45	
46	Warning 46	
47	Warning 47	
48	Warning 48	
49	Warning49	
50	PTC	PTC input indicates that the motor stator windings overheated
51	DLXWarning	DeviceLogix defined warning was generated
52	Warning52	
53	Warning53	
54	Warning54	
55	Warning55	
56	ConfigWarning	Invalid parameter config. See parameters 38-39 for details
57	Warning57	
58	DLXFBTimeoutWarn	DeviceLogix Feedback Timeout Trip was detected
59	Warning59	
60	PM Starts	Number of Starts Warning Level Exceeded
61	PM Oper Hours	Operating Hours Warning Level Exceeded
62	Warning62	
63	Warning63	
64	Warning64	
65	InAnMod1Ch00Warn	Input Channel 00 on Analog Module 1 exceeded its Warning Level
66	InAnMod1Ch01Warn	Input Channel 01 on Analog Module 1 exceeded its Warning Level
67	InAnMod1Ch02Warn	Input Channel 02 on Analog Module 1 exceeded its Warning Level
68	InAnMod2Ch00Warn	Input Channel 00 on Analog Module 2 exceeded its Warning Level
69	InAnMod2Ch01Warn	Input Channel 01 on Analog Module 2 exceeded its Warning Level
70	InAnMod2Ch02Warn	Input Channel 02 on Analog Module 2 exceeded its Warning Level
71	InAnMod3Ch00Warn	Input Channel 00 on Analog Module 3 exceeded its Warning Level
72	InAnMod3Ch01Warn	Input Channel 01 on Analog Module 3 exceeded its Warning Level
73	InAnMod3Ch02Warn	Input Channel 02 on Analog Module 3 exceeded its Warning Level
74	InAnMod4Ch00Warn	Input Channel 00 on Analog Module 4 exceeded its Warning Level
75	InAnMod4Ch01Warn	Input Channel 01 on Analog Module 4 exceeded its Warning Level
76	InAnMod4Ch02Warn	Input Channel 02 on Analog Module 4 exceeded its Warning Level
77	Warning77	
78	Warning 78	
79	Warning 79	
80	Warning 80	
81	DigitalMod1Warn	Digital Expansion Module 1 is not operating properly
82	DigitalMod2Warn	Digital Expansion Module 2 is not operating properly
83	DigitalMod3Warn	Digital Expansion Module 3 is not operating properly
84	DigitalMod4Warn	Digital Expansion Module 4 is not operating properly
85	AnalogMod1Warn	Analog Expansion Module 1 is not operating properly
86	AnalogMod2Warn	Analog Expansion Module 2 is not operating properly

Warning Code	Warning Text	Warning Help Text
87	AnalogMod3Warn	Analog Expansion Module 3 is not operating properly
88	AnalogMod4Warn	Analog Expansion Module 4 is not operating properly
89	Warning89	
90	CtlModMismatch	Control Module installed does not match the expected type
91	SenseModMismatch	Sensing Module installed does not match the expected type
92	CommModMismatch	Comms Module installed does not match the expected type
93	OperStatMismatch	Operator Station installed does not match expected type
94	DigModMismatch	Digital Module installed does not match the expected type
95	AnModMismatch	Analog Module installed does not match the expected type
96	Warning96	
97	Warning97	
98	HardwareFltWarn	A hardware fault condition was detected
99	Warning99	

MCC Object — CLASS CODE 0x00C2

A single instance (instance 1) of the MCC Object is supported:

Table 428 - MCC Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Range	Value
1	Get/Set	Mcc Number	USINT	0-255	0
2	Get/Set	Vertical Section Number	USINT	0-255	0
3	Get/Set	Starting Section Letter	USINT	0-255	65
4	Get/Set	Space Factors	USINT	0-255	0x3F
5	Get/Set	Cabinet Width	USINT	0-255	0
6	Get/Set	Mcc Number	USINT	0-255	0
7	Get	Number of Device Inputs	USINT		EC1=2 EC2=EC3=EC4=4 EC5=6
8	Get/Set	Devices Connected at Inputs	Array of USINT		00000000000000
9	Get	Number of Device Outputs	USINT		2
10	Get/Set	Devices Connected at Outputs	Array of USINT		0000

The following common services are implemented for the MCC Object.

Table 429 - MCC Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x18	No	Yes	Get_Member
0x19	No	Yes	Set_Member

Comm Adapter Info Object — CLASS CODE 0x0C8

No class attributes are supported.

One Instance of the Comm Adapter Info Object is supported with the following attributes

Table 430 - Comm Adapter Info Object Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	System Name String	String	Describes the CEP9 System components installed
2	Get	Trip Status Parameter Location	UINT	The parameter number of the first trip status parameter
3	Get	Number of Trip Status Params	UINT	The number of trip status parameters following the parameter number given in attribute 2. (Max=10)
4	Get	Warning Status Parameter Location	UINT	The parameter number of the first warning status parameter
5	Get	Number of WarningStatus Params	UINT	The number of warning status parameters following the param number given in attribute 4. (Max=10)
6	Set	Selected Input Assembly	UINT	The ENIP writes the input assembly instance specified in an Ethernet/IP Forward Open service connection point.
7	Get	Input Assembly Size	UINT	The size of the chosen Input Assembly
8	Set	Selected Output Assembly	UINT	The ENIP writes the output assembly instance specified in an Ethernet/IP Forward Open service connection point.
9	Get	Input Assembly Size	UINT	The size of the chosen Output Assembly

The following common services are implemented

Table 431 - Comm Adapter Info Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

CEP9 Status Object — CLASS CODE 0x0375

The following instance attributes are supported:

Table 432 - CEP9 Status Object Instance Attributes

Attribute	Name	Byte	Data
2	Overload Data	0	OL Time to Trip
		1	
		2	OL Time to Reset
		3	
		4	%Therm Utilized
		5	

Attribute	Name	Byte	Data
2	Trip and Warning Status	0	Trip Status Current
		1	
		2	Trip Status Voltage
		3	
		4	Trip Status Power
		5	
		6	Trip Status Control
		7	
		8	Trip Status Analog
		9	
		10	Warning Status Current
		11	
		12	Warning Status Voltage
		13	
		14	Warning Status Power
		15	
		16	Warning Status Control
		17	
		18	Warning Status Analog
		19	
3	Digital I/O Status	0	Input Status Word 0
		1	
		2	Input Status Word 1
		3	
		4	Output Status Word 0
		5	
4	Device Data and Status	0	Device Status Word 0
		1	
		2	Device Status Word 1
		3	
		4	Base ID Word
		5	
		6	Digital IO Module ID Word
		7	
		8	Analog Module ID Word
		9	
5	Config Trip/Warning Data	0	Invalid Config Parameter Number
		1	
		2	Invalid Config Parameter Cause Code
		3	
6	Motor Statistics	0	Elapsed Time
		1	
		2	Starts Counter
		3	
		4	Starts Available
		5	
		6	Time to Start
		7	

Attribute	Name	Byte	Data
7	Time and Data	0	Year
		1	
		2	Month
		3	
		4	Day
		5	
		6	Hour
		7	
		8	Minute
		9	
		10	Second
		11	
8	Current and GF Current in Amps	0	L1 Current
		1	
		2	
		3	
		4	L2 Current
		5	
		6	
		7	
		8	L3 Current
		9	
		10	
		11	
		12	Average Current
		13	
		14	
		15	
		16	Ground Fault Current
		17	
		18	Current Imbalance
		19	
9	Current as a Percentage of FLA	0	L1 Percent FLA
		1	
		2	L2 Percent FLA
		3	
		4	L3 Percent FLA
		5	
		6	Average Percent FLA
		7	
10	Line to Line Voltage	0	L1-L2 Voltage
		1	
		2	L2-L3 Voltage
		3	
		4	L3-L1 Voltage
		5	
		6	Average Voltage L-L
		7	

Attribute	Name	Byte	Data
11	Line to Neutral Voltage	0	L1-N Voltage
		1	
		2	L2-N Voltage
		3	
		4	L3-N Voltage
		5	
		6	Average Voltage L-N
		7	
12	Voltage Data	0	Voltage Unbalance L-L
		1	
		2	Voltage Frequency
		3	
		4	Voltage Phase Rotation
		5	
13	Real Power	0	L1 Real Power
		1	
		2	
		3	
		4	L2 Real Power
		5	
		6	
		7	
		8	L3 Real Power
		9	
		10	
		11	
		12	Average Real Power
		13	
		14	
		15	
14	Reactive Power	0	L1 Reactive Power
		1	
		2	
		3	
		4	L2 Reactive Power
		5	
		6	
		7	
		8	L3 Reactive Power
		9	
		10	
		11	
		12	Average Real Power
		13	
		14	
		15	

Attribute	Name	Byte	Data	
15	Apparent Power	0	L1 Apparent Power	
		1		
		2		
		3		
		4	L2 Apparent Power	
		5		
		6		
		7		
		8	L3 Apparent Power	
		9		
		10		
		11		
		12	Average Apparent Power	
		13		
		14		
		15		
16	Power Factor	0	L1 Power Factor	
		1		
		2	L2 Power Factor	
		3		
		4	L3 Power Factor	
		5		
		6	Total Power Factor	
		7		
17	Real Energy	0	Total Real Energy	kWh X 10E9
		1		
		2		kWh X 10E6
		3		
		4		kWh X 10E3
		5		
		6		kWh
		7		
		8		kWh X 10E -3
		9		

Attribute	Name	Byte	Data	
18	Reactive Energy	0	Total Reactive Energy Consumed	kVARh X 10E9
		1		
		2		kVARh X 10E6
		3		
		4		kVARh X 10E3
		5		
		6		kVARh
		7		
		8		kVARh X 10E-3
		9		
		10	Total Reactive Energy Generated	kVARh X 10E9
		11		
		12		kVARh X 10E6
		13		
		14		kVARh X 10E3
		15		
		16		kVARh
		17		
		18		kVARh X 10E-3
		19		
		20	Total Reactive Energy Net	kVARh X 10E9
		21		
		22		kVARh X 10E6
		23		
		24		kVARh X 10E3
		25		
		26		kVARh
		27		
		28		kVARh X 10E-3
		29		
19	Total Apparent Energy	0	Total Apparent Energy	kVAh X 10E9
		1		
		2		kVAh X 10E6
		3		
		4		kVAh X 10E3
		5		
		6		kVAh
		7		
		8		kVAh X 10E-3
		9		
20	Demand	0	kW Demand	
		1		
		2	VAR Demand	
		3		
		4	VA Demand	
		5		

Attribute	Name	Byte	Data
21	Peak Demand	0	Max kW Demand
		1	
		2	Max VAR Demand
		3	
		4	Max VA Demand
		5	
22	Analog Input Values	0	Analog Expansion Module 1 Input Channel 00
		1	
		2	Analog Expansion Module 1 Input Channel 01
		3	
		4	Analog Expansion Module 1 Input Channel 02
		5	
		6	Analog Expansion Module 2 Input Channel 00
		7	
		8	Analog Expansion Module 2 Input Channel 01
		9	
		10	Analog Expansion Module 2 Input Channel 02
		11	
		12	Analog Expansion Module 3 Input Channel 00
		13	
		14	Analog Expansion Module 3 Input Channel 01
		15	
		16	Analog Expansion Module 3 Input Channel 02
		17	
		18	Analog Expansion Module 4 Input Channel 00
		19	
		20	Analog Expansion Module 4 Input Channel 01
		21	
		22	Analog Expansion Module 4 Input Channel 02
		23	
23	Analog Expansion Module Status	0	Analog Expansion Module 1 Status
		1	
		2	Analog Expansion Module 2 Status
		3	
		4	Analog Expansion Module 3 Status
		5	
		6	Analog Expansion Module 4 Status
		7	
24	Trip History	0	Trip History 0
		1	
		2	Trip History 1
		3	
		4	Trip History 2
		5	
		6	Trip History 3
		7	
		8	Trip History 4
		9	
25	Warning History	0	Warn History 0
		1	

Attribute	Name	Byte	Data
26	Trip Snapshot	0	TS L1 Current
		1	
		2	TS L2 Current
		3	
		4	TS L3 Current
		5	
		6	TS % TCU
		7	
		8	TS GF Current
		9	
		10	TS L1-L2 Voltage
		11	
		12	TS L2-L3 Voltage
		13	
		14	TS L3-L1 Voltage
		15	
		16	TS Total Real Power
		17	
		18	TS Total kVAR
		19	
		20	TS Total kVA
		21	
		22	TS Total PF
		23	

The following common services are implemented.

Table 433 - CEP9 Status Object Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x03	No	Yes	Get_Attribute_List
0x0E	No	Yes	Get_Attribute_Single

Rockwell Automation Publication CEP9-UM015B-EN-P October 2014
Supersedes publication CEP7-UM015A-EN-P - April 2014
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